



United Nations Industrial  
Development Organization  
(UNIDO)



Peruvian Amazon Research  
Institute (IIAP)



# STRATEGIC PLAN FOR THE DEVELOPMENT OF BIOINDUSTRY IN THE AMAZON - MARAÑÓN RIVER CORRIDOR IN PERU

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## STRATEGIC PLAN FOR THE DEVELOPMENT OF BIOINDUSTRY IN THE AMAZON AND MARAÑÓN RIVER CORRIDOR IN PERU

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(UNIDO)



Peruvian Amazon  
Research Institute  
(IIAP)



Peru-Ecuador Binational Border  
Development Plan

### CONTACTS:

UNIDO:	Geram Appelgren Latin America Representative – Bolivia	<a href="mailto:gapplegren@unido.org">gapplegren@unido.org</a>
	George Tzotzos Biodiversity Unit – Austria	<a href="mailto:george@binas.unido.org">george@binas.unido.org</a>
IIAP:	Dennis del Castillo Torres President	<a href="mailto:preside@iiap.org.pe">preside@iiap.org.pe</a>
	Yolanda Guzmán Guzmán Office for Scientific and Technological Cooperation	<a href="mailto:asesores@iiap.org.pe">asesores@iiap.org.pe</a>
Binational Plan:	Manuel Picasso Executive Director for Binational Plan - Peruvian Chapter	<a href="mailto:planbinacional@rree.gob.pe">planbinacional@rree.gob.pe</a>
	Mauro Mendoza Binational Plan Environmental Coordinator	<a href="mailto:mmendoza@rree.gob.pe">mmendoza@rree.gob.pe</a>

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Peruvian Amazon Research Institute  
Av. Abelardo Quiñónez Km. 2.5 Iquitos – Perú  
E-mail: [preside@iiap.org.pe](mailto:preside@iiap.org.pe)  
Tel: +51-(0)94-265515 Fax: +51-(0)94-265527  
<http://www.iiap.org.pe>    <http://www.siamazonia.org.pe>    <http://www.siturismo.org.pe>

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## Executive Summary

The Peruvian Amazon Research Institute (Instituto de Investigaciones de la Amazonia Peruana - IIAP), under an agreement with the United Nations Industrial Development Organization (UNIDO) has prepared this Strategic Plan proposal, designed to make bioindustry promotion viable in the Amazon-Marañon River Corridor, thus contributing to the development of the North Eastern Zone of the Peruvian Border with Ecuador.

Bioindustry, as we understand it, is the set of productive activities that, through rational use of the Amazon region's biological diversity, supply products with added value for domestic and foreign markets. For this purpose, it is essential to combine the enormous potential of our biological diversity and the valuable knowledge accumulated by the population in the Amazon region.

The integration of this region in national development plans poses a double challenge in the search for new forms of land occupation: adherence to the fundamental principle of **utilization without destruction**; and fulfillment of our responsibility to the international community, as a country with multiple forests and aquatic ecosystems that are regarded as a **common asset**, or providers of goods and services for life itself.

### **The Amazon-Marañon Corridor and the current context:**

This corridor possesses a biological diversity of great significance in the areas of agriculture, wildlife and hydrobiology. This area also harbors considerable cultural diversity: In ethnolinguistic terms there are

12 families, 58 groups, and 16 sub-groups. This diversity also includes other population groups, with their considerable sociocultural knowledge about the use and conservation of biological diversity.

The Amazon-Marañon Corridor is approximately 910 kilometers in length and has three clearly defined sectors:

- a) The western sector: lies between Bagua and the Campanquiz Cordillera in the border zone between Amazonas and Loreto Departments and has direct road access to the coast and the Pacific Ocean;
- b) The central sector between the Campanquiz Cordillera and Nauta is accessible only by river,
- c) The eastern sector, between Nauta and Mazan, which has river and air access.

The supply of trained professionals is provided by three universities, with a postgraduate school and twenty-four faculties. However, it is calculated that the demand for highly specialized personnel will have to be met from sources outside the region.

The support infrastructure for bioindustry requires upgrading, particularly in terms of ports and docks, roads, energy, and cold-storage services.

The main norm on taxation is Law 27037 (Law on Investment Promotion in the Peruvian Amazon), which provides exemptions and tax concessions for those who engage in agricultural, aquicultural, fishing, tourism and manufacturing activities. This law also created the Fund for Promotion

of Investment in the Amazon Region (FOPRIA), with approximately US\$30 million in start-up capital; these funds have yet to be released.

Finally, the legal framework for bioindustry consists of the Convention on Biological Diversity, the Decisions of the Andean Community (CAN), the Peruvian Constitution, the National Strategy on Biological Diversity, and twelve local laws that stipulate the mechanisms for obtaining access to biological and genetic resources. There are also provisions that protect intellectual property.

### **Challenges for bioindustry promotion.**

In the Peruvian Amazon, bioindustry represents an opportunity to establish competitive product lines. Within the context of the new international order and market trends, this opportunity can be seized by supplying natural products that are free from agricultural chemicals, or new products derived from biological diversity that target market niches in such areas as the food industry, preventive medicine, pharmacopoeia, plant fibers, or beauty products.

We have identified six product lines with bioindustry potential. This potential is basically assessed in terms of:

- a) Classification of species as native to the Amazon
- b) Having a current link to the markets
- c) Availability of production technologies
- d) Capacity to guarantee a sustainable supply, and,
- e) Experience coordination with other productive activities.

According to these criteria, we have selected the following product lines: tropical fruits, hydrobiological products, tropical flowers and foliage, medicinal plants, plant fibers and wild animal breeding technologies. The main obstacle bioindustry faces is the weak or non-existent market positioning of value-added biodiversity products. This is a major cause of low and inefficient use of biodiversity resources, limited impact on the regional economy, and disinterest in the conservation of this natural asset on the part of the local population.

We have identified three main causes at the root of this serious problem: Non-existence of an organized supply of products, the non-adoption or lack of technology in the value chain process, and lack of knowledge or identification for market niches. Therefore, the greatest challenge lies in stimulating bioindustry and creating favorable conditions for making its output competitive on the domestic and international markets. In order to achieve this, it will be indispensable to implement an effective promotion policy, strengthen macroeconomic conditions and public institutions, and enhance the technological capacities in the region and the country as a whole.

### **Bioindustry: a strategic bet for the development of the Amazon Region.**

The plan prepared clearly points towards a new style of development for the Amazon region, advocating a sustainable management culture, as opposed to the harmful, mercantilist culture based simply on extraction of natural resources.

We propose the commercialization of products with added value to replace the increasingly less profitable sale of raw materials as a central strategy to overcome the paradox of constituting a region with great biological diversity but with high poverty indicators.

Although in the short and mid-term economic growth can be activated through mining investments, the results obtained are unsustainable in the long run due to this industry's dependence on exhaustible natural resources.

Therefore, we are betting on the management of biological diversity as the only sustainable long-term alternative for the Peruvian Amazon development.

That is what our Vision for 2022 sets out to do: *"Bioindustry is one of the pillars of sustainable development in the Amazon-Marañon Corridor, achievable through the positioning of competitive productive lines in the local and international markets with the participation of both medium-sized and large productive units; to help preserve ecosystems, incorporate diverse cultural expressions, and improve the quality of life."*

This vision will be accomplished through five strategic objectives:

- 1) Incorporate within bioindustry raw materials originating from managed natural stocks and efficient production systems.
- 2) Develop new and better targeted products with the highest possible value added, using Amazonian biodiversity resources.
- 3) Develop markets for targeted products originating from different Amazonian biodiversity species.
- 4) Develop the competitiveness of bioindustry in order to boost productivity in a climate of macroeconomic stability and integration with domestic and international economy;

- 5) Create suitable conditions to stimulate an attractive environment for investment in bioindustry.

All these objectives are simultaneously integrated around four strategic axes: quality production, administration and management capacity, human resource quality, and environmental efficiency.

The success of this plan requires the commitment and participation of all stakeholders in bioindustry development, as well as the participation of government entities, entrepreneurs and business associations, producers' organizations, indigenous and mestizo communities, NGOs and other strategic allies to stimulate this activity.

In the area of action, the stimulation of bioindustry must be achieved through *unleashing strategies* aimed to ensure efficiency in the use of biodiversity resources, well-organized production and commercialization, access to financial and non-financial services, development of the chain value and the market, production quality, infrastructure improvements.

Additionally, the development of bioindustry will rely on *process strategies* aimed at promoting policies on science and technology, human and integration capacities, and a new export-oriented business culture.

### **2003/2008: The First Stage of the Plan.**

In order to contribute to the viability of this proposal, we have prepared a financial plan for the first stage of the process, with a budget of US\$7.65 million.

This contribution must be used to develop institutions and business capacities for bioindustry during the period 2003/2008,

through a program, whose main activities would be:

- a) Specialization in promotion and management of bioindustry through the creation of a bioindustry development organization (ADBIO).
- b) Strengthening production, commercialization, and business organizations through training programs in business administration and development of a quality-oriented culture
- c) Improvement in financial capacities and access to regional credit, calling for the creation of a *revolving bioindustry investment fund*
- d) Development of domestic and international markets for bioindustry products.

Finally, these activities are designed to obtain the following results over the first five years:

- Creation and operation of an autonomous institution specializing in bioindustry promotion – the Bioindustry Development Agency (ADBIO).

- Bioindustrial companies improve their productive organization, thus enhancing their ability to compete.
- A defined plan in place for financing bioindustry.
- Business plans for selected bioindustry lines.
- Stakeholders informed about all the components of the value chain.
- Investment program for targeted products defined.
- National agreements defined on basic aspects of bioindustry
- Emerging “Amazonian - Andean image” on the domestic and international markets.

In summary, these are the main proposals contained in the Strategic Plan for the Development of Bioindustry in the Amazon - Marañon River Corridor in Peru.

# Introduction

## Background

Article 69 of the Constitution of Peru provides that the Peruvian State should promote the sustainable development the Amazon region.

In keeping with this mandate, IIAP promotes a *Sustainable Development Vision for the Peruvian Amazon Region*, combining four aspects, including an economic dimension, and proposes the conversion of mercantile extractive activities into production systems with management plans. The vision also identifies bioindustry as a strategic activity that encourages the development of a production base as well as environmental and social sustainability.

The basis of the peace agreement between Peru and Ecuador framed by the ideal of *Peace with Development*, is to implement a sustainable development program in the Peruvian Amazon border region, aimed to improve quality of life for the local population and to stimulate peace, integration and cooperation.

One of the main objectives of this program is to promote sustainable economic growth in a manner consistent with the social and natural reality of the border region. Emphasis will be placed on increasing value-added production through investment programs that include the ***Sustainable Utilization of Biodiversity Project***.

Within the framework of the Convention on Biological Diversity, Peru has implemented a National Strategy on Biological Diversity, which includes a Regional Strategy on the Biological Diversity of the Amazon Region: One of the main objectives of this strategy is

to establish competitive productive lines based on biological diversity.

The Peruvian Government and UNIDO have signed an agreement to strengthen sustainable industrial development in Peru.

The **Strategic Plan for the Development of Bioindustry in the Amazon-Marañón River Corridors** has been developed in this framework as a guide for the development of a new productive base in this corridor, capable of stimulating a competitive economy that is environmentally aware, creates jobs, and combines the contributions of different cultural expressions.

This document deliberately excludes certain aspects that also represent considerable development potential in the proposed corridor, since we regard them as lying outside our mandate. These include forestry activities with a logging component, tourism, and the environmental services market.

## Nature and the scope of the problem

The development potential of the Amazon region rests on its enormous biological diversity. However, much of that diversity remains unknown, and what is known has been used in a way that plunders resources.

Within this universe of living beings there are forest resources that are recognized for their nutritional, medicinal and industrial properties. The products made from these resources have considerable commercial potential in the domestic and international markets.



However, these resources are currently extracted without management plans or techniques, causing the depletion of natural stocks.

Additionally, these products are sold in a natural or fresh state, with no added value; processing and preservation are largely absent. The result is a marginal, undervalued supply without adequate quality standards.

Despite the fact that population groups in the Amazon make intensive use of resources to maintain their families, the Amazon region's contribution to GDP is very low and has continued to decline, from 11% in 1980 to less than 9% in the past few years.

Regional production has a very large component of extractive activities (50%), as well as commerce and services (33%).

Processing, manufacturing and construction make up only 17% of the regional economic output.

### **The importance of bioindustry**

The sustainable use of biological diversity constitutes the only lasting option for development in the Amazon region, given the almost unanimous acknowledgement that efforts to achieve economic growth based on exploitation of non-renewable resources are unsustainable in the long run.

Bioindustry represents a new style of economic development for the Amazon region, opposed to the extractive and plundering approach used to date.

The Amazon-Marañon Corridor provides an example of a possible approach to be used, ahead of the processes of settlement and productive activity that will come with the implementation of the proposed integration and border development program.

This new development model takes into account the prospects for the international market for natural products, which is pursuing a rising growth trend.

For example, the organic foods market is worth around US\$20 billion<sup>1</sup> a year, and is mainly concentrated in Europe (45%), United States (40%), and Japan (12%).

Additionally, International trade in medicinal and aromatic plants moves some 440,000 tons per year. In 1996 sales totaled US\$1.3 billion.

It is calculated that by 2010 the world market for medicinal plants will be worth an estimated US\$100 billion.

Completing this scenario, fish consumption currently tops 65 million tons a year, with an annual *per capita consumption of 13kg*.

Peru's participation in the current natural products market is insignificant. However, bioindustry in the region may make it easier to harness these opportunities through the sustainable management of biological diversity, with the added value of natural assets and local knowledge, in order to generate wealth and employment in line with an orderly, decentralized occupation process of Peruvian territory.

### **The process at the regional level**

The ***Strategic Plan for the Development of Bioindustry in the Amazon-Marañon River Corridor in Peru***, is part of a process developed with the participation of different sectors of regional society in the Departments of Loreto and Amazonas, who are interested in helping to develop bioindustry as an activity that offers tangible benefits to the population without negatively affecting the region's environment.

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<sup>1</sup> For the purposes of this document billion = 1,000 million.

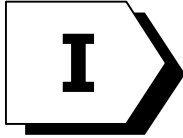
In the 2001, the Peruvian State launched the National Strategy for Biological Diversity, and it was in this context that the bioindustry development strategy was formulated, starting with consultation workshops with stakeholders in Loreto and Amazonas.

We also obtained valuable support from a large group of Peruvian and foreign consultants (Annex 7).

This proposal, however, needs to be refined and validated through consultation with additional stakeholders including entrepreneurs, government agencies, the financial system, and the international technical and financial cooperation agencies.

For this reason, this participatory process will continue to seek commitments and a much more proactive involvement on the part of stakeholders in the development of the Peruvian Amazon region.





# **BIOINDUSTRY CONTEXT ANALYSIS**

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## 1.1 THE PERUVIAN AMAZON

### 1.1.1 General characteristics

The Peruvian Amazon region covers an area of approximately 74 million hectares (equivalent to 61% of the country's surface) and has an estimated 3.5 million inhabitants.

This territory is strategically important for national development because it contains vast natural and cultural assets in terms of mining and energy resources (oil, gold, natural gas), biological diversity, ecosystems, and the valuable traditional practices and knowledge stored by Amazon peoples.

If properly developed, these assets could be the foundation of multiple national productive activities oriented towards bioindustry and biobusiness, thus helping to boost the country's competitiveness and the well-being of its population.

The potential in natural resources in the Amazon is easy to see: 40 million hectares of forest; an annual average of 702 billion cubic meters of surface water ([www.senamhi.gob.pe](http://www.senamhi.gob.pe), 2002); 124 million barrels of proven oil reserves (40% of the country's proven reserves), 8.5 billion cubic feet of natural gas and 569.2 million barrels of natural gas liquids (NGL), which represent 98% of the country's natural gas reserves (Tello, 2001).

However, the fossil fuel reserves are finite and production is clearly on the downturn. In 1980, 46.6 million barrels were produced, compared to 22.6 million barrels in the 2000.

This indicates that in the long run the Amazon regional economy will need to sustain itself through the use and management of renewable resources,

particularly those provided by its biological diversity.

Widespread cultural heterogeneity is another distinctive aspect of the Amazon region. In addition to the mestizo population, the area is inhabited by close to 300,000 indigenous people (1993 Census, INEI) divided ethnolinguistically into 12 families, 58 groups, and 16 sub-groups, living in 1,145 indigenous communities (GEF/UNDP/UNOPS, 1997).

Historically, the exploitation of its natural resources and the consequent generation of wealth have led to the emergence of new productive options. Booms in exploitation and export of natural products have been very short-lived because little was done to ensure the continuous availability of the resource or to develop local processing industries.

The Amazon region's share of GDP is extremely low and has been diminishing (from 11% in 1980 to 8% recent years). Regional output is composed of an array of activities very strongly dependent on extraction (50%), commerce and services (33%). Processing activities, such as manufacturing and construction, account for 17%.

More than 50% of the extraction activities entail exploitation of non-renewable resources, such as oil, natural gas, and placer gold.

Biological diversity production, which accounts for a lower GDP share than the above described sectors, mainly entails forestry extraction, fishing, and to a lesser degree, non-timber forest products such as native fruits, medicinal and ornamental plants, plant fibers, fauna, latex and resins, amongst others.



There is extensive, though unprofitable, agricultural and livestock farming, which is geared primarily to supplying the local market: (cassava, banana and corn). The main component in the area of livestock is poultry farming, followed, to a lesser extent, by cattle and pig breeding. Apart from coca, the agricultural exports are coffee and cocoa, both of which offer limited profits.

Manufacturing and processing place very low in the regional production value chain, and the technology used is very often obsolete, as in the forestry sector.

Regional industry mainly consists of primary processing: sawmills, lamination, bark pulverization (of "cat's claw"), pulp concentration (camu-camu), washing, drying and classifying of coffee and cocoa (see Annex 2).

Non-renewable products such as oil and gold are extracted and sold on the domestic and international markets.

Exports from the Amazon region total approximately US\$600 million (9% of national exports) from different productive activities: hydrocarbons (crude oil, US\$125 million), forestry (US\$30 million), agriculture (US\$425 million), of which more than 95% comes from coffee and cocoa), tourism (close to US\$10 million), and gold mining (almost US \$30 million).

The activities with the largest growth potential in the short term are hydrocarbons, thanks to the Camisea gas field. While logging could quickly increase its contribution to more than US\$1 billion a year if the 20 million hectares of forest allocated by the State to forestry production are developed under management plans and competitive business schemes.

In the current context, one of the main challenges for the Amazon peoples is to deal successfully with modernization and insertion

in the international market. Problems with access, lack of modern commercial practices, and innovation and adaptation of competitive technologies are the main obstacles for this process.

Traditional knowledge of the forest and use of biodiversity resources are assets that should be rescued and protected for the benefit of the communities. However, protecting and recording this knowledge and technology in the framework of globalization also poses a significant challenge.

### **1.1.2 Biological diversity of the Peruvian Amazon**

Currently, the inter-specific diversity of our planet contains 1.75 million identified species out of an estimated total of 13 million.

Peru is considered one of the 10 "mega diverse" countries in the world due to the large variety of species it contains.

The biological diversity of the Peruvian Amazon Region is found in 31 life zones out of 84 that exist in the country; it comprises 7,372 species of plants, 263 mammals, 806 birds, 180 reptiles, 262 amphibians and 697 fish.

The intra-specific diversity is intrinsic to each species and is manifested as races, varieties, ecotypes and other forms of variation that indicate the expression of populations and genotypes that emerge from the process of natural selection in response to the pressures of nature. Once identified, intra-specific diversity or genetic diversity are the basis for genetic improvement programs. Therefore, its preservation is clearly important as well as an obligation.

Proper use of biodiversity produces a broad range of goods and services, such as protection of aquifers, carbon fixing, eco-

tourism, bioprospecting, bioproducts, biochemistry or genetic chemistry, as well as construction materials, natural dyes, essential oils, resins, medicinal extracts, handcrafts, fruit pulps, nectars, frozen products, and others.

### **A) Diversity of agricultural importance**

The Peruvian Amazon Region contains a vast number of fruit, medicinal, and ornamental plant species. These native genetic resources are of vital importance to consolidate a new style of development built on sustainable foundations, that through their huge variety help to increase options for improving crop and livestock production, mainly through the use of biotechnology.

The potential area with suitable soils for farming in the Peruvian Amazon Region is limited to 3.26 millions hectares of arable land (3.41%), 2.21 million hectares of permanent crop land (2.31%), and 11.37 million hectares of pastures (11.89%) most of which are already in use.

Most of the Peruvian Amazon region (82.39%) is made up of forests and protected areas (78.92 million hectares, ONERN, 1982). The lands used for crop and livestock farming are mainly located in the Amazonian highlands (central Huallaga valley, central Amazonian region, Jaen, Bagua, and La Convencion).

In the Amazonian lowlands the soil in non-flooding areas and ancient terraces are acid, not very fertile, well drained, deep and have a high clay content. There are also heavily leached infertile areas known as "white sands", which are composed of sandy quartz (Kauffman et al, 1998). In recently built terraces the soil is young, not particularly differentiated, and sometimes poorly drained.

The flood plains are composed of both, fertile and well drained areas, as well as acid

and poorly drained soils deficient in nutrients (Rodríguez, 1990; Paredes Arce *et al*, 1998). The nutrient content in these soils depends greatly on the minerals contained in the sediments transported by rivers, as well as various geological conditions in the drainage areas. (Kalliola *et al*, 1993).

These lands, also known as riverbank complexes, are where the bulk of riverside communities are located and cover an area of 2.89 million hectares in the Department of Loreto. This is also where most subsistence farming activities are located.

Due to the huge annual importance of the natural replenishment of alluvial soil nutrients, we consider that there is considerable potential for growing native crops adapted to these conditions. Such crops include camu-camu, huasai, ubos, bell apple, and olla de mono, which can be produced naturally, that is, without the use of agrochemicals.

### **B) Fauna diversity**

A large number of fauna have varying degrees of economic importance, especially for the indigenous and peasant populations in rural areas. The main uses of wildlife we can point out:

Food: sajino, venado, huangana, majaz, sachavaca, añuje, ronsoco, turtles (various species), armadillo, paujil, pucacunga, amongst others (See Annex 2 for scientific and Spanish common names).

Health: Diverse species of monkeys, snakes, arthropods, and other animals.

Commercial skins and leathers: sajino, huangana, venado, caimans, snakes (various species), and ronsoco.

Handcrafts and ornaments: bird feathers and arthropods.

Pets: Parrots and other birds, monkeys and some other land mammals, turtles, serpents, caimans and other reptiles, various amphibians and arthropods.

Given that the Amazon ecosystem is extremely fragile and the population density of most wild animals is low, wild animal breeding technologies constitutes an ecological, economic and socially viable alternative way of providing a supply of selected species for which there is great demand in local markets (meat) and international markets (hides and animals for the pet market).

Peruvian legislation favors this type of activity, not only with respect to intensive breeding of animals in captivity or on farms, but also through the extensive management of so-called "managed wildlife areas".

**C) Hydrobiological diversity**

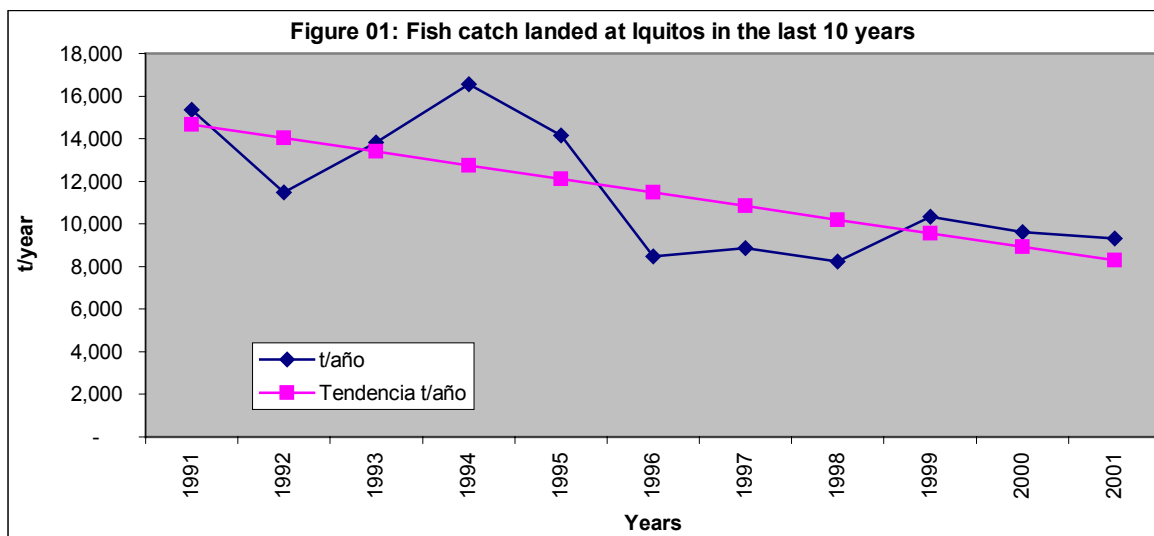
The aquatic ecosystems and habitats (rivers and lakes) of the Amazon region are shared by an exceptional diversity of mammals (manatee, otter, ronsoco), birds, reptiles (turtles, ophidians, caimans), amphibians, fish (around 800 species), and invertebrates (crustaceans, lamellibranchiates).

The Peruvian Amazon is part of the largest source of freshwater on the planet. The Department of Loreto alone has an estimated 488,184 hectares of rivers and 99,067 hectares of lakes, which represent the main natural resource for fishing development.

Fish for human consumption is the largest source of animal protein in this region; some 80,000 tons per year are consumed (Brack, 2000). Fish are caught by artisan methods from small boats, and in some cases using larger fishing boats fitted with freezing equipment.

The main species fished include boquichico, *yulilla*, red-tailed sabalo, gamitana, paco, palometa, sardine, chambira, lisa, ractacara, dorado, doncella, zungaro, maparate, cunchi fierro, carachama, tucunare, arawana, paiche, corvina.

However, catches of these species are on the decline, as shown by Figure 1.



Aquiculture is a growing activity thanks to the extensive water resources, the need to satisfy the growing demand for fish at the local, national and international level, as well as the management and conservation technologies that IIAP has made available.

Fishfarming in artificial environments can produce yields of 4,000 to 8,000 kg of meat per hectare per year (Brack 2000). The fish already being farmed include paiche, paco, doncella, dorado, gamitana, boquichico, sabalo, churo, etc.

Ornamental fish IIAP has identified 420 species of ornamental fish that are exploited commercially: cichlids (discus fish, freshwater angelfish, bujurqui), corydora, macana, metines, palometa, piranha, pleco, otonocilus, pimelodids (novia, cahuara, pimelodella, red tail cat), stingrays, and tetras, pechito), among others (See Annex 2).

### 1.1.3 Cultural diversity and traditional use of natural resources

As mentioned, the Amazon indigenous population is divided ethno-linguistically into 12 families, 58 groups and 16 subgroups as follows:

**Jibaro family.** Includes the Aguaruna, Huambisa, Achual, Jíbaro, Candoshi (Subgroups: Candoshi or Murato, Shapra).

**Huitoto family.** Includes the Ocaina, Resigaro, Bora, Andoque, Huitoto (Subgroups: Huitoto Muinane, Huitoto Murui, Huitoto Meneca).

**Capanahua family.** Includes the Chayahuita, Jebero, Balsapuertinos.

**Arahuaca family.** Includes the Yanesha, Asháninka, Asheninka, Nomatsiguenga, Povenisati, Perené Asháninka, Ucayali Asháninka, Pichis Asháninka, Machiguenga,

Kugapirapitingari, Piro, Culina, Chamicuro, Iñapari.

**Harakmbet family.** Includes the Amarakaeri (Subgroups: Amarakaeri, Huachipaeri, Sapiteri, Arasaeri, Toyoeri, Kisamberi, Pukirieri)

**Pano Family.** Includes the Cashibo - Cacataibo, Shipibo - Conibo, Amahuaca, Cashinahua, Capanahua, Yaminahua, Mayoruna, Isconahua, Morunahua, Mayo - Pisabo, Curajeño, Parquenahua, Sharanahua (Subgroups: Sharanahua, Marinahua, Chandinahua, Mastanahua).

**Tacana family.** Represented by the Ese'ejja.

**Tucano family.** Includes the Secoya, Angoteros, Maijuna.

**Tupi-Guarani family.** Includes the Cocama-Cocamilla, Omagua.

**Záparo family.** Includes the Arabela, Iquito, Andoa.

**Peba Yagua family.** Represented by the Yagua.

**Quechua family.** Includes the Quechua Pastaza, Lamista, Napo Quechua, Tigre Quechua.

Several other ethno-linguistic groups have also been identified but not classified. These include the Urarina or Itucali, Ticuna, and Taushiro.

In addition to indigenous peoples, the Amazon region population also includes *mestizos*, settlers, and descendents of foreign immigrants.

The importance of these populations for bioindustry lies in their social practices, ancient local knowledge and techniques (generally sustainable) for making use of

biodiversity resources. We must also take into account that sedentarization, population growth, and technological changes have started to take their toll on the immediate surroundings.

Each community has knowledge regarding the use and management of their local natural resources, is part of the local society and shares with neighbors a cultural heritage of technical, ecological, historical knowledge and ritual expressed in diverse languages and of discourses.

In varying degrees, "local traditions" are distinguished from one another by the different activities in which communities engage: hunting, fishing, forest extraction, vegetable gardening, healing, cooking, handcraft production and festivals and ceremonies. Amongst this diversity of cultural expressions, different cultures and societies share common traits which enable us to refer to them collectively as an "Amazon Civilization".

### **A) Socio-cultural and economic organization of the indigenous people.**

The people of the Amazon region use natural resources from the forest and its waters to sustain their domestic economies. This does not always follow the same pattern as the urban household built around a family nucleus, since very often the 'household' includes many other families who are blood relatives.

Communities beyond a certain size are not sociologically homogenized entities; they are not "units". The inhabitants divide themselves in terms of *labor activities, distribution and ceremonial groups* mainly based on the principle of reciprocity. Relationships are formed according to varying criteria, such as blood ties, pseudo-blood ties, neighborliness, and friendship.

One trait that sets these societies apart from urban societies is their sociological vision, which encompasses human beings and 'natural beings' (animals, 'owners' of plants and animals, 'spirits, 'souls'). Both types of beings are part of one society and, as such, communicate, exchanging and providing each other services through diverse forms of discourse (rituals).

One might call it a "social partnership with nature" ("*societure*") in which human beings and nature come together to form a whole.

The mechanism for coexistence within this "social partnership with nature" are: dialogue, exchange and mutual service. This relationship with 'natural beings' entails certain forms of conduct and obligations that set limits on the exploitation of resources and has a restraining effect on human impact on the environment.

In societies where these values no longer work efficiently and have been substituted by commercial values, the ecological balance has been affected and depletion has begun to prevail over regeneration and conservation.

### **B) Productive and healing activities of indigenous peoples.**

Productive activities include hunting, fishing, forest extraction, vegetable gardening and handcrafts.

Hunting is carried out with shotguns, dogs and, in the more isolated regions, with the blowpipes (*pucuna*) and bows and arrows. Trapping is also used and involves a variety of implements.

Fishing is carried out with hooks, nets, funnel-shaped traps (*nasa*), and by making dams (*tapajes*) using palm leaves or wild cane. The use of different types of barbasco is declining because its harmful environmental effects and is being



discourage through environmental education efforts.

The harpoon and the bow and arrow (*shipibo*) are also used for fishing.

Forest plants and trees provide leaves for roofs; palm tree wood and bark for house construction; timber for sale; *chonta* palm (for palm hearts); edible wild fruits; fibers for making handcrafts, medicines and dyes.

The inventory of things that provide food, medicines and raw materials varies from one zone to another, as well as from one town to the next.

Equally, knowledge of these multiple species, their habitat, way of life, and uses varies among different communities.

No single community knows everything there is to know about any species. Only by comparing and gathering knowledge about a given species from different communities can we obtain a more complete vision of its characteristics and potential.

Short-cycle plant cultigens and cultivars are grown as single crops or in association with other crops in lowland alluvial lands. Multi-cropping in different degrees and associations is the norm in highland areas, where medium-cycle and perennial crops are also cultivated.

In highland farms and vegetable gardens it is common to see staple crops cultivated alongside plants grown for medicinal uses, as dyes, for making handcrafts, and, in some parts, for their aromatic properties (perfumes).

Traditional staple crops are unripe bananas, cassava and corn. The area between the Napo and Putumayo rivers is an ancient cultural frontier, east of which wild or poisonous yucca is processed into cassava,

replacing manioc and maize as the main staple food.

However, an examination of the array of the cultigens found among different Amazonian peoples shows that a sizeable amount of the local biodiversity has been domesticated (20 to 80 cultivated species) not only use as food, but also for medicinal, handcraft-making, and 'magical' purposes.

As with hunting, fishing and extraction, vegetable gardening traditions vary from one town to the next, not only in terms of the range of domesticated species and their varieties, but also with respect to the knowledge of their soil requirements, planting patterns, which crops can be grown in association, and the way are dealt with pests.

Each community manages their own cultivation system composed of a particular set of cultivation practices and knowledge of the forest regeneration cycle.

Handcraft production has increased and has diversified in certain regions with access to the tourist market. In parts where this commercial stimulus is absent, the range of locally manufactured products has diminished or has been substituted by industrially manufactured goods.

In spite of the growing consumption of industrially produced medicines, witchdoctors play a very important role in a great many communities. Treatment regimes combine the use of plants and *icaros* (chanted prayers). In addition a fundamental psycho-social trust between doctor and patient is crucial.

These traditions also vary from one people to the next: one plant might be used in one place for one disease, while an individual from another community would use another plant to treat the same condition.

Sometimes, medicines that use a given plant are different in each regional town.

In this universe, the healer is the person that supervises the ties between human beings and 'natural beings'. The healer is familiar with complex knowledge, webs of

symbolic association among plants, their properties, their 'owners', animals and other 'spiritual' entities, and the ills that they can inflict upon human beings.

## 1.2 MACROECONOMIC AND INSTITUTIONAL CONTEXT

### 1.2.1 Tax framework for bioindustry promotion

The Peruvian Constitution provides that the Peruvian economic system is governed by the following principles:

- a) Free private enterprise, with the State acting in a subsidiary promotional capacity (Article 58).
- b) Free enterprise, trade and industry, and the promotion of small business development (Article 59).
- c) Economic pluralism, a subsidiary business role for the State and equitable legal treatment for state and private sector business activity (Article 60)
- d) The national treatment or equal conditions for Peruvian and foreign investors (Article 63).

The policies of the State designed to harness the considerable resources of the Amazon region for the country's economy have been implemented only on a periodic basis, each time with similar socioeconomic and environmental effects. Above all, it has taken the form of short-lived booms starting at the beginning of the 20<sup>th</sup> century and with greater frequency since the world economic slump of 1929-1930.

There are three identifiable historical stages in the definition of public policy on the Peruvian Amazon:

The first stage could be regarded as a promotional stage in which economic activity in the region was stimulated through a series of concessions. Such is the case of the 1938 treaty with Colombia that lowered import duties on materials, inputs, and capital goods. The same occurred with Law 15600 of 1965, which declared the region a "tax free zone". That law was in effect - though with a series of cuts- until 1990.

In response to these incentives, some new industries established themselves in the Amazon region: for instance palm oil production in Uchiza; refrigerator plants, corrugated iron sheet factories, and breweries in Pucallpa; and a motorcycle assembly plant in Iquitos.

In 1976 a law was passed creating a regional dividend of 10% (*ad valorem*) of total oil trading. The proceeds were to be used for the development of basic infrastructure and social services in the region. In 1982, the Industry Act was passed, offering tax benefits on the creation of industries in the jungle region until the year 2000.

The second stage, which came in the first half of the 1990's, was one of reconsideration and even elimination of investment incentives in the Amazon region. The scope of the agreement with Colombia and duration of the Industry Act were reduced. Products from outside of the region were made liable to an excise tax (*Impuesto Selectivo al Consumo*, or ISC) and

sales tax (*Impuesto General a las Ventas*, or IGV).

The third stage of promotion of Amazon Development began in 1998 with the introduction of the dividend on gas production from the Aguaytia gas field; the creation of CETICOS-LORETO, a transformation and services center offering tax and tariff incentives for exports; the promulgation of Law 27037 on Investment Promotion in the Amazon Region; the Peru-Ecuador Peace Agreement, which includes a sustainable development plan for the northern border region over the next 10 years and investments in the order of US\$777 million; and the Mineral Royalties Act, which covers the main renewable and non-renewable resources.

The tax framework of the Amazon region, in particular the Amazon – Marañón corridor, is mainly provided by the Law on Investment Promotion in the Amazon Region, which creates mechanisms designed to attract, retain, compensate, and articulate investments over the next 50 years. However, the Department of Amazonas is not covered by the benefits of this law.

Taxpayers in the Department of Loreto who devote themselves to farming, aquaculture, fishing, tourism, forest extraction and manufacturing activities associated with processing and marketing primary products are liable to income tax at the low rate of 5%. The condition is that the goods must originate in the region, and that the at least 70% of the assets and/or production must be located and/or carried out in the Amazon region.

Farming and processing activities involving the following products are exempt from income tax: cassava, soy bean, arracacha, uncucha, urena, huasai, pijuayo fruit, aguaje, anona, caimito, starfruit, cocona, soursop, guayaba, cashew, malay apple, purple ushum, tangerine, grapefruit, sapote,

camu-camu, cat's claw, achiote, pineapple, sesame seed, brazilnut and barbasco (See Annex 2).

Additionally, trading companies located in Loreto that reinvest at least 30% of their profits in investment projects pay income tax at 5%. The normal income tax rate for the country is 30%.

Taxpayers who engage in the sale of goods, services, and construction, as well as the first sale of real estate carried out in the Amazon are exempt from sales tax.

The aforementioned activities and native species have access to fiscal credit from sales tax of between 25% and 50% of the gross monthly tax on sales of taxable goods carried out outside the Amazon region. Sales tax for the rest of the country is 18%.

An Amazon Region Investment Promotion Fund (FOPRIA) has also been set up with an initial allocation of US\$30 million. This entity should provide financing for basic infrastructure projects, productive programs, and studies for rural and technological development. The Law that created this fund also provides for implementation of an investment program on port, airport, road and energy infrastructure.

The Executive Committee for the Promotion of Private Investment in the Amazon Region has been created for administration purposes. This Committee will supervise the Reference Plan for Amazon Region Concessions and the Committee for targeting spending execution and public investment in the Amazon region. FOPRIA and the above administrative bodies are in the process of implementation.

Supplementary to the promotion program is the Peru-Colombia Customs Protocol, which sets tariffs and customs duties on imported goods and services in the region.

The anticipated impact of these promotion measures is to haul the region out of its structural recession, (currently growing at a higher rate than the population (3.5%)), and to develop a productive base that is stimulated by bioindustry that is sustainable, based on consensus, provides high added value in the production chain, and is integrated into the domestic and international markets.

### 1.2.2 Financing for Bioindustry

In the past few decades, diverse policies have been applied in order to make financing available to stimulate economic growth, through promotion of productive activities and development of production infrastructure.

Economic activities once had access to financing from the agrarian and industrial development banks, and to promotional loans financed by oil trading dividends. However, the economic reforms of the early 1990s effectively put an end to the national promotional finance system.

Development banks, in particular the agrarian bank, had an adverse stimulus against biodiversity conservation because loans were released as forests were cleared to plant the single crops in fashion at the time, ignoring the land's forestry potential, the low fertility of the soils, the wealth of biological diversity and the fragility of the ecosystem.

Another aspect that should be considered has to do with the way the traditional financial system operates, which is at odds with the socioeconomic and spatial conditions in the region. In the urban areas, there are a number of micro-businesses that increase the value-added of biodiversity products. However, their financial needs are not met because they are not eligible for credit.

The situation is even worse in rural areas, where business units are family-based, small and dispersed, and lack the title deeds to their property. These factors make them ineligible for obtaining credit.

One characteristic of the financial system is that interest rates are kept very high, which is symptomatic of a highly dollarized financial system. The rate is based on a cost structure in which the international cost of money accounts for 28% of operating costs, and the bad-debt portfolio 23%. For its part the cash reserve requirement accounts for only 3% of the structure, while 46% -in other words, almost half the cost- is attributed to the country risk and the internal market risk factors.

Hence, monetary policy measures are targeted not at the cash reserve requirement, operating costs or the external interest rate, but at diminishing perceived country-risks, which is helped by clear signs of macroeconomic stability, transparent rules of play, firm and independent supervising and regulatory bodies, and separation of powers.

The national and regional financial system must adapt to the new global trends in order to be able to access new markets, especially in the areas of eco-business, biobusiness, environmental funds, as well as new instruments, financial products and operating protocols under which environmental variables are taken into account for credit decisions.

Financing regional investment is clearly dependent on national savings and foreign investment, since regional savings account for only around 3% of GDP.

Hence, there is a need to create a propitious climate to attract, retain, compensate, and offer basic and economic infrastructure; in other words, to stimulate investment with

the capacity to compete in other national and international market.

Currently, bioindustry has very limited access to credit from the traditional private banking sector because of the absence of suitable financing sources in it, high interest rates, the cost of financial services, requirements that are disconnected from the Amazon region's socioeconomic and biophysical reality, obsolete technology, and virtually no propensity to save. This situation means makes it impossible to seize excellent business opportunities because of the need for high profit margins to cover the inefficiencies of the system.

However, in recent years a series of instruments have been developed: financing sources for biobusiness production chains, such as credit lines, guarantee funds, venture capital funds, business development funds, competition funds, and business angels. But access to these sources requires adequate training for financial operators and entrepreneurs if they are to facilitate financing for biobusiness.

### 1.2.3 Institutional Framework

Peru has many institutions linked in one way or another to bioindustry. Although the country's laws contain no explicit definition of the concept of bioindustry *per se*, the laws do include different components of bioindustry, such as agroindustry, fishing technology, the chemical and phytochemical industry, and wild animal breeding technologies, amongst others.

As Annex 3 shows, there are many public and private entities connected with bioindustry: Ministries of Economy and Finance; Agriculture; Fishing; Health; and Industry, Tourism, Integration and International Trade Negotiations.

Also involved with this activity is the National Institute of Natural Resources, National

Institute for Agricultural Research, Peruvian Technological Institute for Fishing, National Fund for Fishing Development, Peruvian Amazon Research Institute, Harbormaster and Coastguard Office, National Council for Science and Technology, National Institute for the Defense of Competition and Protection of Intellectual Property, Export Promotion Commission, and the Customs Authority.

The following are also important players: the Peruvian Biotrade Committee, Exporters Association, Central Reserve Bank of Peru, Small and Micro-Business Promotion Commission, National Development Institute, and National Industry Association, among others.

Private entities participate at all stages of the value chain, generating jobs and income for the country. For their part, public entities act on a promotional and regulatory capacity, providing the legal and administrative framework, in addition to offering a range of services: technical, financial, organizational, training, commercial, taxation, information, and health services, among others.

One of the key areas of institutional support is information on markets and bioindustry technologies. Currently, although each entity has implemented and maintains its own information systems, an integrated system specifically geared to bioindustry is needed, that would act as a basic orientation platform, providing support to all the stakeholders involved.

SIAMAZONIA is not only the only information system on biological diversity operating in the Amazon region, but also the only one of its kind in the country. Furthermore, its profile meets the development requirements of the GBIF, at which Peru is currently an observer country.



## 1.3 LEGAL FRAMEWORK FOR BIOINDUSTRY

### 1.3.1 Scope and Stipulations

Peruvian public policy on conservation and the use of biodiversity is governed by two basic provisions:

- (a) Article 68 of the 1993 Constitution, which provides that the State shall promote conservation of biodiversity and protected natural areas; and
- (b) Article 37 of the Environment and Natural Resources Code of 1990, which provides that it is a pressing obligation for the State and for individuals and corporate bodies to safeguard the conservation, defense, restoration, sustained development, and dissemination of the natural heritage of the Nation.

The Convention on Biological Diversity (CBD) and the Decisions of the Commission of the Andean Community (CAN) are also core aspects of this legal framework.

The following are the main sectoral and trans-sectoral legal norms regulations that contain the conditions and procedures for access to the natural resources of Peru's biodiversity.

#### Agricultural Sector

- Law on Conservation and Sustainable Use of Biological Diversity (Law 26839 of 1987), also known as the Biodiversity Law.
- Law on Protected National Areas (Law 26834 of 1997).
- Organic Law on the Sustainable Use of Natural Resources (Law 26821 of 1997).
- Forestry and Wildlife Law (Law 27308 of 2000).

#### Fishing Sector

- General Fishing Law (Law 25977 of 1992).

#### Multi-sectoral

- Law on Investment Promotion in the Amazon Region (Law 27037 of 1998).
- Law on Prevention of Risks Derived from the Use of Biotechnology (Law. 27104 of 1999).
- Law on Sustainable Use of Medicinal Plants (Law 27300 of 2000).
- Law on the National System for Environmental Impact Assessment (Law 27446 of 2001).
- National Environmental Fund Law (Law 26793 of 1977).
- Industry Act (Law 23407 of 1982).
- Water Act (Law 17752 of 1969).

It is necessary that environmental legislation connected with biotrade activities, promote the competitiveness of businesses established on Peruvian soil and not unnecessarily obstruct economic activities in the country from obtaining the greatest possible benefits (Alegre, 2001).

### 1.3.2 Access to genetic resources and sharing of benefits

Under the Biodiversity Law (Law 26839) the rights granted to biological resources do not extend to the genetic resources they contain. According to the 1993 Constitution, genetic resources are part of the national heritage. The general framework for bioprospecting activities or access to genetic resources in Peru is provided by Articles 1 and 15 of the Convention on Biological Diversity (CBD) and Decision 391 of the CAN.

Article 1 of Decision 391, defines "access" as the *"capture and utilization of genetic resources kept ex situ and in situ, of byproducts thereof, or, as applicable, of intangible components thereof, for the purposes, inter alia, of research, biological*

*prospecting, conservation, industrial application, or commercial use.”*

Given that regulations for implementation of Decision 391 have yet to be adopted, this area is governed by a specific provision on bioprospecting contained in the Forestry and Wildlife Law.

The Law on Sustainable Use of Medicinal Plants establishes as guiding principles for their use: a) respect for peasant and native communities; and, b) equitable distribution of benefits arising from research and development of products obtained from such plants.

The Biodiversity Law recognizes the importance and value of the knowledge, innovations, and practices of native and peasant communities for the conservation and sustainable use of biological diversity. It also recognizes the need to protect that knowledge and to create mechanisms to promote its use with the knowing consent of native communities, and to ensure the fair and equitable distribution of the benefits that arise from that use (Article 23)

With respect to the intangible dimension of biodiversity, efforts are underway to prepare “Proposal Regulations on the Protection of the Collective Knowledge of Indigenous Peoples, and considerations on the regulation of access to genetic resources.”

It is necessary to define the procedures for distribution to communities for benefits obtained from the use of traditional knowledge. It is also imperative to update technology in the country so that it may continue to progress in the use of genetic resources; create infrastructure in the form of laboratories and specialized equipment for effective supervision of trade in genetic resources; and implement a database on the country’s genetic resources and traditional knowledge linked to an information network

that monitors developments in access to genetic resources at the international level.

Peru has also enacted a Law on Prevention of Risks Derived from the Use of Biotechnology (Biosafety Law), which contains all the norms applicable to activities connected with research, production, introduction, handling, transport, storage, conservation, exchange, commercialization, restricted use and liberation of living modified organisms (LMOs) under controlled conditions. One of the top current concerns is uncertainty surrounding the impact of LMOs on the Amazon’s rich biodiversity.

In sum, Peru has adequate laws in place to guarantee the use of biodiversity for bioindustry development. Additionally, these laws also ensure fair and equitable distribution of benefits, conservation of biological diversity and the genetic resources contained, development of scientific and technological capacity, and the country’s bargaining capacity.

### **1.3.3 Intellectual property rights.**

In Peru intellectual property rights are protected by law. They are divided in two groups: copyright and industrial property rights.

Copyright protects the intellectual creations in the areas of literature, art, science, software, and other created by human ingenuity. In Peru, such matters are governed by Legislative Decree 822 (Copyright Law).

The legal norms that govern industrial property are Legislative Decree 823 (Industrial Property Law) and Decision 486 of the CAN on Common Regulations on Industrial Property.

The rights of breeders of new plant varieties are protected by Supreme Decree 008-96-ITINCI and by Decision 345 of the CAN.

Legislative Decree 823, which came into effect April 1996, protects and governs matters connected with industrial property: patents, protection certificates, utility models, industrial designs, industrial secrets, product and service brands, collective marks, certification marks, trade names, commercial slogans and appellation of origin.

This decree also establishes the requirements, procedures, rights, and limitations associated with the legal registration and recognition of each of these elements; INDECOPI is the competent authority in this area.

Decision 486 of the CAN provides rules similar to those mentioned above, but it applies specifically to its member countries.

In the particular case of the Amazon-Marañon Corridor one possible alternative available is the registration of collective marks of producers of a given crop or animal (camu-camu, paiche, gamitana, majaz, etc.), which would encourage producers to organize and adopt a common strategy to compete on the open market.

This method could stimulate the development of a given geographical area, since it indicates that the product is of optimum quality because it comes from a specific area known for the quality of its products or special production techniques (for instance, ascorbic acid content, production without using agrochemicals, use of traditional knowledge, etc.).

In sum, rules on industrial property are in place in Peru and should be included in any business strategy. This applies not only to bioentrepreneurs, but also to farmers, fish breeders, and producers' organizations. This could be used as an instrument to break into new markets.

### 1.3.4 Seal of quality, certification and accreditation.

**Seal of quality or conformity** is issued by certification agencies accredited by INDECOPI. The seal is affixed to products to show that they conform to particular technical standards of quality.

One of the advantages of the quality seal is that it also tends to standardize product quality.

**Certification and accreditation.** The Technical and Trade Regulations Commission of INDECOPI supervises compliance with procedures for **accreditation** of **certification** agencies, inspection agencies, and test and calibration laboratories. It also regulates the certification activities of accredited agencies.

The following certification agencies operate in Peru:

- SAT – Sociedad de Asesoramiento Técnico S.A.C.
- SGS del Perú S.A.C.
- International Analytical Services S.A.C. – INASA
- Instituto de Certificación, Inspección y Ensayos La Molina Calidad Total – Laboratorios.
- Bureau Veritas S.A. Sucursal del Perú.
- Certificaciones del Perú S.A. – CERPER

Systems and Management Certification Titles:

- Instituto Colombiano de Normas Técnicas y Certificación – ICONTEC

## **1.4 THE AMAZON - MARAÑÓN CORRIDOR; IDENTIFICATION OF CHARACTERISTICS AND EVALUATION OF RESOURCES.**

### **1.4.1 Territorial occupation and boundaries of the area of influence**

The Amazon River flows through Peru and Brazil before reaching the Atlantic Ocean. It starts in Peru at the confluence of the Ucayali and Marañón rivers, both of which are navigable year-round, making them important river transport routes.

The South American Presidential Summit held in Brasilia in 2000, gave priority to the issue of South American integration through the transport corridors. One route is the Amazon multi-modal corridor (Corridor 6), which links the Brazilian ports of Belem and Macapa on the Atlantic Ocean to the Peruvian port of Paita on the Pacific. Transport is by river from the ports of Belem and Macapa in Brazil to the port of Saramiriza in Peru; large cities en route include Manaus in Brazil and Iquitos in Peru, among others. From Saramiriza, traffic continues by road to the port of Paita (see Figure 2).

Through the National Office for Border Development of the Ministry of Foreign Affairs, Peru has also targeted macro-regions for border development (South, Amazonian, and North) with a view to implementing integration strategies with neighboring countries (Ecuador, Colombia, Bolivia, and Chile).

The Paita-Cabalococha Development Corridor is a part of this development framework (see Figure 3).

The Peru-Ecuador Binational Border Development Plan, which has been prepared and designated as a priority measure for implementation in order to

consolidate the peace process in both countries, is based on lasting and equitable social and economic development, targeting five binational transport corridors that will stimulate trade between the two countries. This will require the construction and rehabilitation of roads (see Figure 4).

In keeping with these South-American and national priorities, in recent years, IIAP, in coordination with a variety of public and private institutions in the region, has been progressively encouraging debate with a view to developing a common agenda on sustainable development of the Amazon region.

Thus far IIAP has defined sustainable development as follows: "To ensure the well-being of Amazon societies and increase the contribution of the region to national development".

In order to achieve this objective, we have proposed four global strategies: to develop human capabilities; increase regional supply; adequate environmental management; and institution building.

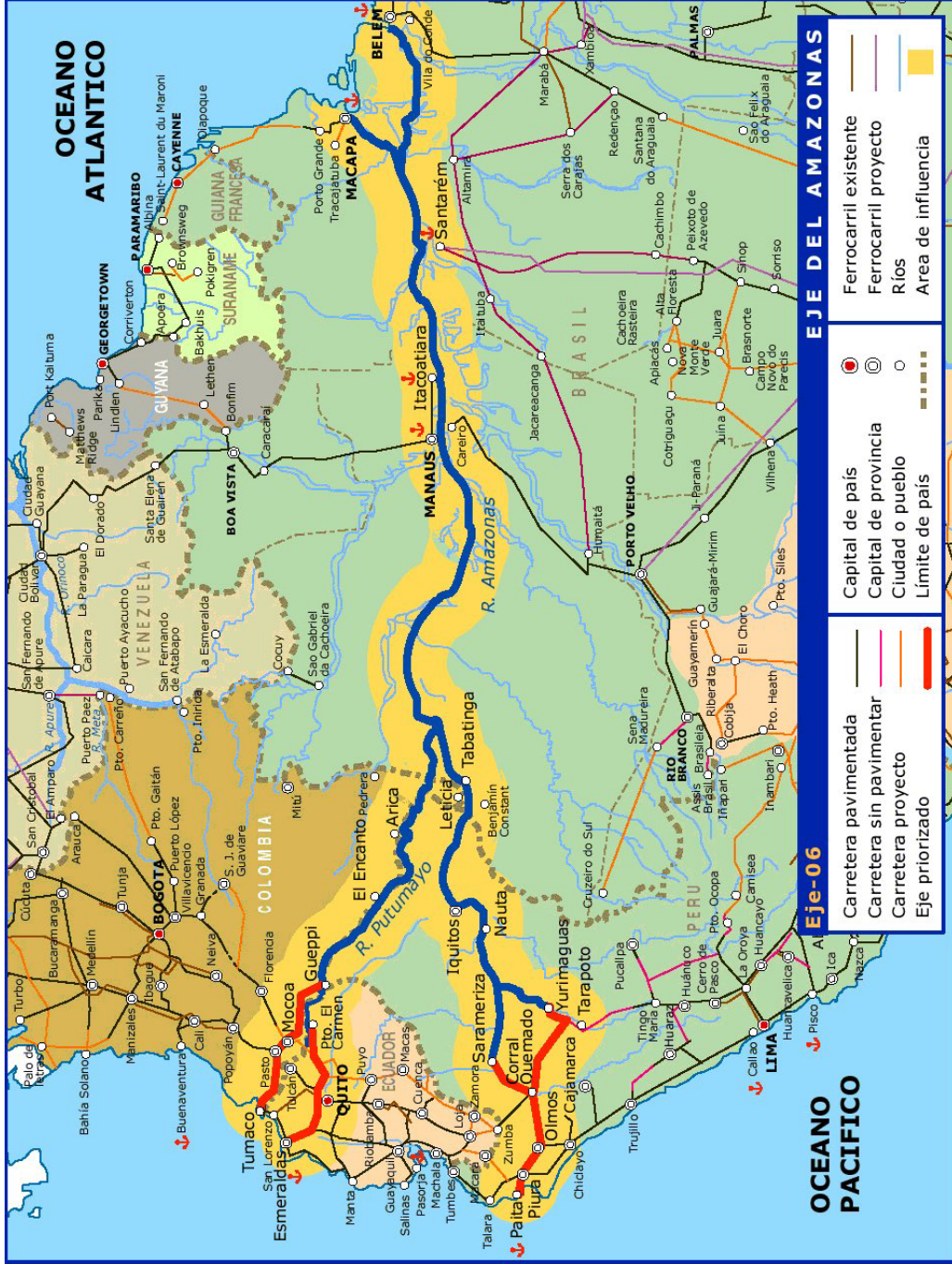
In the framework of the strategies for increasing regional supply and adequate environmental management, it is proposed to develop and strengthen economic corridors, supported by land management planning based on economic and ecological zoning.

In the Northeastern region of the Amazon, the viability of this strategy will be based on two main economic corridors: the Amazon-Ucayali corridor and the Amazon - Marañón - Huallaga corridor, both of which share the Amazon River.



STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑÓN RIVER CORRIDOR IN PERU

Figure 2: Amazon Integrated Multi-modal Transport Corridor - Corridor 6

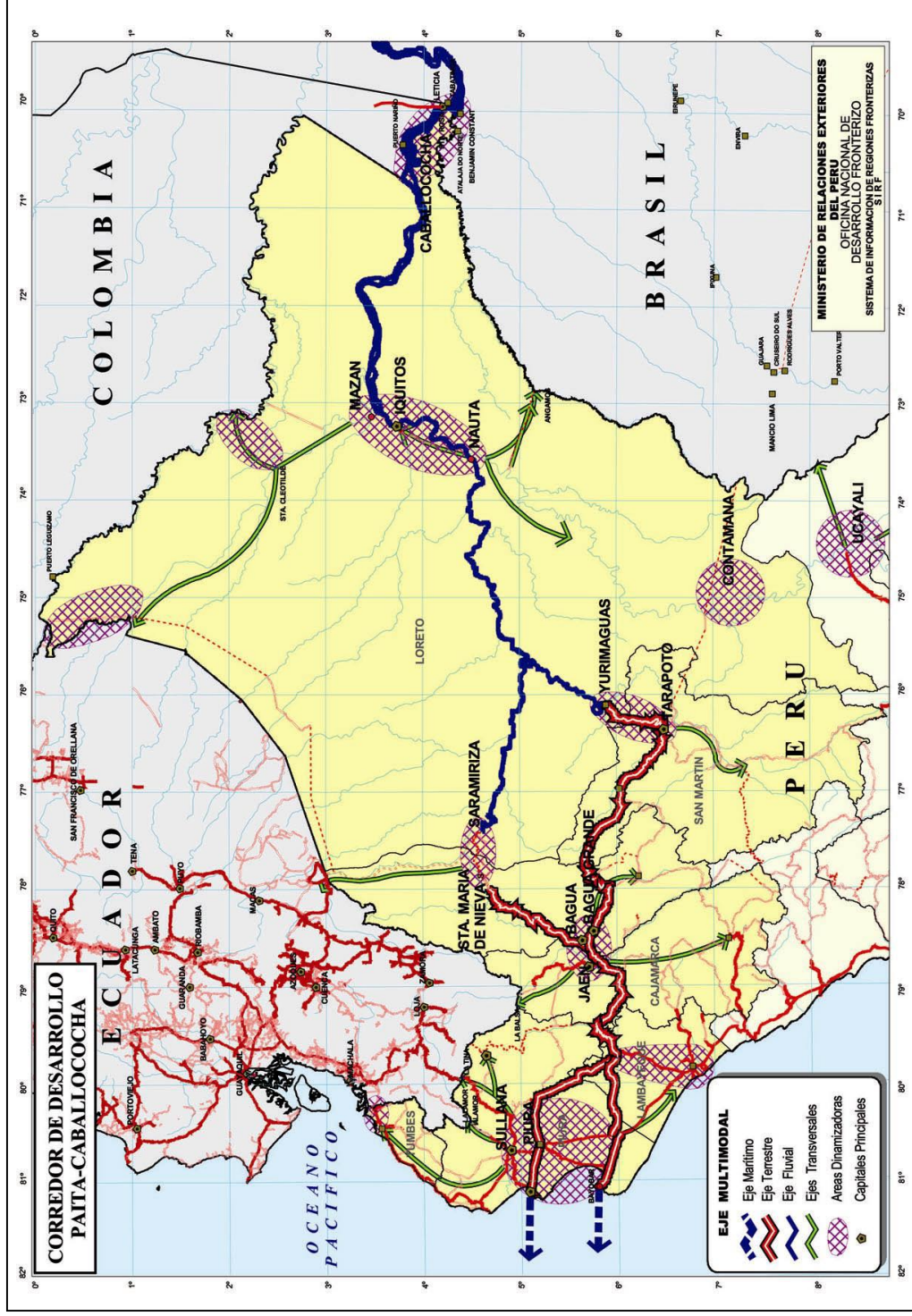


Source: Integración de la Infraestructura Regional en América del Sur – <http://www.iirsa.org>



STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑÓN RIVER CORRIDOR IN PERU

Figure 3: Paita - Caballococha Development Corridor

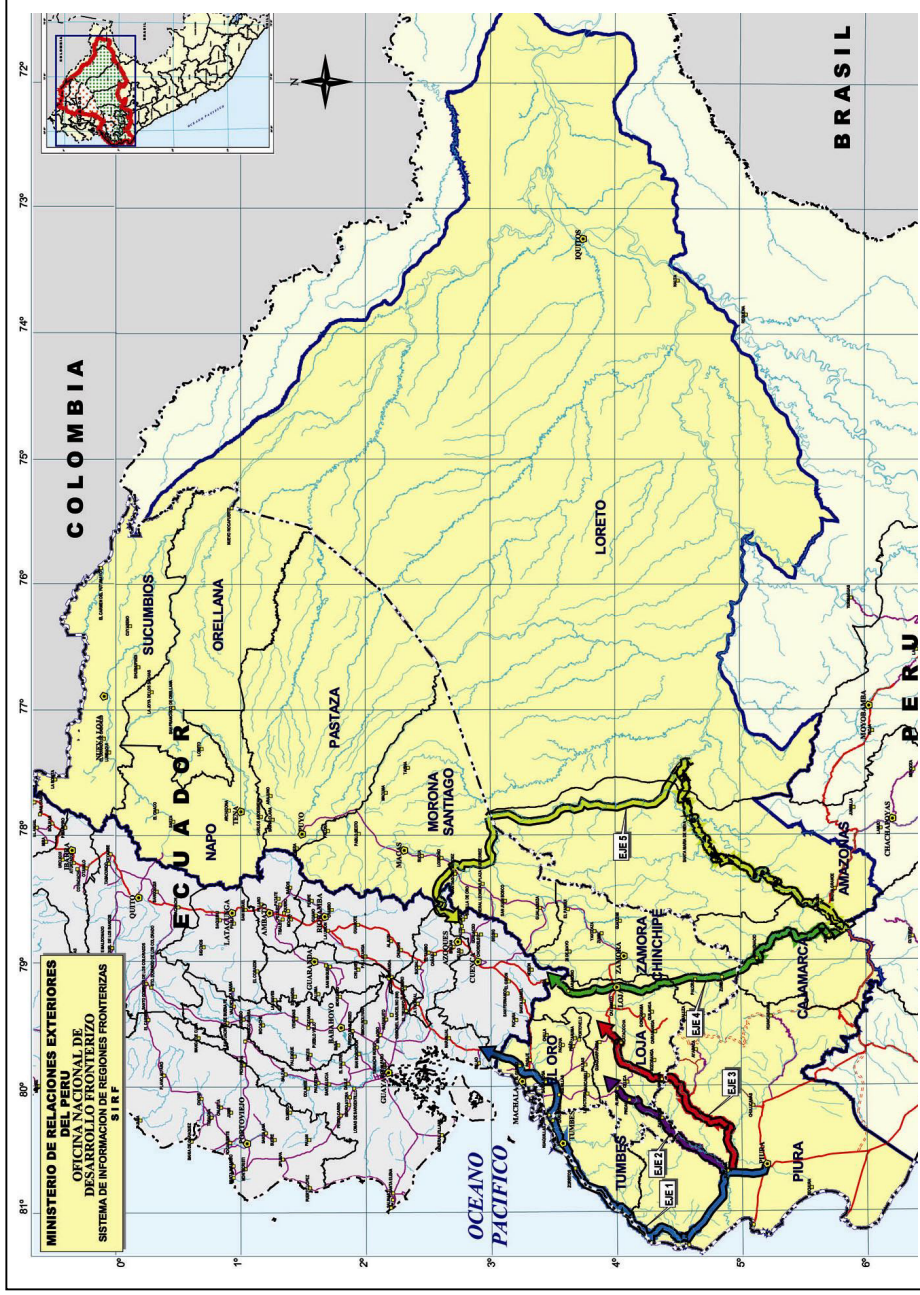


Source: Ministerio de Relaciones Exteriores del Perú





Figure 4: Transport Corridors for Integration of the Peru-Ecuador Border Region



(Source: Ministerio de Relaciones Exteriores del Perú)



These corridors not only contribute to regional integration, but also facilitate a permanent flow of goods and services to the interior of the region (by river network), the rest of the country (by road, from Yurimaguas, Saramiriza and Pucallpa), and abroad (via the Amazon river to Brazil), including the ports on the Atlantic Ocean and the Peruvian ports of Callao and Paita on the Pacific coast. Currently, the Amazon-Ucayali axis is the most developed.

In the framework of the Peru-Ecuador Binational Border Development Plan, the Sustainable Development Plan for the Peruvian Amazon Border Area identified three areas of action:

- a) A critical strip, which comprises the populations located along the border.
- b) An immediate support area, which includes all of the intermediate districts and their areas of influence.
- c) Remote support area, which covers the corridor connecting the main towns of Iquitos, Nauta, San Lorenzo, Lagunas, Saramiriza, Santa Maria de Nieva, Imacita, Bagua and Jaen.

In the remote support area, whose main function is to provide an economic development corridor that supports the rest of the border region, two activities with high economic potential have been targeted: bioindustry and ecotourism.

In keeping with these land occupation strategies, the primary area of influence of the bioindustrial development strategy will basically be the remote support area, labeled the Amazon-Marañon Development Corridor.

On the Bagua side, the outer boundary is formed by the border of the Department of Amazonas and, on the Iquitos side, by that of the Maynas province in the Department of Loreto. Initially, activities will be centered in four areas:

- (1) The cities of Iquitos, Nauta and Mazan;
- (2) The city of Lagunas because it connects economic movements from the Marañon, along the Huallaga river, to the Yurimaguas-Tarapoto highway;
- (3) The cities of San Lorenzo, Saramiriza, and Borja; and
- (4) Santa María de Nieva, Imacita, and Bagua.

The Binational Plan also takes into account a secondary area of influence formed by the road systems connecting Rioja, Bagua, and Saramiriza, (Transport Corridor 4); and Mendez, Puerto Morona, Santa Maria de Nieva, and Saramiriza (Transport Corridor 5).

The northern river network formed by tributaries of the Marañon and Amazon Rivers is also taken into consideration. This network will help to facilitate trade and integration in the border areas of Ecuador, Colombia and Brazil (see Figure 5).









### 1.4.2 Physical characteristics of the Amazon-Marañon Corridor.

The area of influence of the Amazon-Marañon corridor has been divided into three large sectors determined by physical factors and altitude.

The **western sector** is located between Bagua and the Cordillera de Campanquis, in the highland jungle sub-region. Politically, it is part of the provinces of Bagua and Condorcanqui in the Department of Amazonas. It is approximately 300 km long and features predominantly mountainous and rough terrain with wide valleys. This section also has development potential in the areas of hydroelectricity, tourism, and gold mining.

Climatically it divides into two sub-sectors:

a) The Bagua - Pongo de Rentema Sub sector (60km) features a semi-dry tropical climate. The vegetation is mainly thin, scattered scrub with typical biological diversity for this type of area. The soils are fertile but hydroelectric potential is limited.

b) The Pongo de Rentema - Cordillera de Campanquiz sub-sector (240 kms.), which has dense wet tropical forests and more biological diversity. Soils here are typically low in natural fertility.

**The central sector**, between the Cordillera de Campanquiz and Nauta is the largest (450 kms) and is characterized by flat, undulating terrain, poor drainage, and widespread swampy ecosystems that are periodically inundated.

This sector contains the largest *aguaje* natural fruit groves in Peru (hydromorphic ecosystems dominated by the aguaje, which produce this fruit). The fruit is a common part of the diet of the Loreto population and there is a rising trend in its consumption at the regional level. In the Department of Loreto there are 5.64 million hectares of

these groves that could be brought under management.

Lake Rimachi, the second largest lake in the Amazon (approximately 3,000 hectares) is also in this sector. The lake offers strong possibilities for the management of paiche and other hydrobiological resources.

The farmlands in this sector are of average fertility. They are located in the inundation areas of the Marañon River and in areas around the sources of its tributaries, known as *restingas*. This sector is very rich in biodiversity, justifying the creation of the Pacaya Samiria National Reserve (2.1 million hectares) in the area known as the Ucayala Depression between the Marañon and the Ucayali rivers.

**The eastern sector** (160 km), located between the towns of Nauta and Iquitos, including the extension to Mazan, contains both highlands and flood land ecosystems.

The wooded land is mainly tropical rainforest, but this has been badly degraded by migrant agriculture.

The central and eastern sectors are part of the Amazon lowlands sub-region and belong to the jurisdictions of the provinces of Alto Amazonas, Loreto, and Maynas in the Department of Loreto.

These two sectors have great bioindustry potential, and could produce natural products under sustainable production systems thanks to the following comparative advantages:

- Naturally fertile soils in floodplains due to nutrients contained in sediments annually deposited by river waters.
- Good river access, reducing produce transport costs.

- Extensive availability of natural freshwater sources for production of mollusks, fish, frogs (*chellonios*), lizards, snakes and aquatic mammals.
- Ready adaptability of many plant species to growing conditions in inundation areas.
- High potential for fish and land fauna, capable of supplying virtually all the animal protein needs of riverside communities.
- River and multi-modal links to regional, national and international markets.

25% of the total native population of the Amazon region. In numerical terms the dominant groups are the Aguarunas (18,000) on the Upper Marañón, Potro and Apaga rivers; Quichuas (15,000) on the Napo and Tigre rivers; and the Candoshis (5,000) on the lower Pastaza River and its tributaries.

After them, in numerical order come the Urarinas (Corrientes, Tigre, Urituyacu, Chambira); the Achuales (Morona and Pastaza); the Jeberos (district of Jeberos); the Cashibos (Zungarococha); the Huitotos (Napo and Lower Nanay); and the Arabelas (Upper Nanay and Pastaza).

### 1.4.3 Socioeconomic characteristics

From a socioeconomic point of view, this corridor is the most dynamic in Northeastern Peru, with a population density of over 6 inhabitants per square kilometer.

It is inhabited by mestizo riverside populations and various indigenous groups. The urban population, comprising more than 60% of the total population of the region, resides mainly in the city of Iquitos (350,000 inhabitants), as well as in Bagua (19,200 inhabitants), San Lorenzo, Lagunas and Nauta.

Broadly speaking, the population living inside this corridor and its immediate area of influence numbers 841,000, of which 132,000 belong to the provinces of Bagua and Condorcanqui in the Department of Amazonas, and 709,000 to the Department of Loreto (provinces of Alto Amazonas, Loreto and Maynas). A breakdown of the provincial populations can be seen in Annex 4.

The corridor formed by the Amazon, Marañón, and their tributaries contains nine ethno-linguistic groups who number 53,550 inhabitants and represent approximately

Thanks to its dynamism and the concentration of activities within it, the Amazon-Marañón Corridor provides no less than 80% of the GDP of the Departments of Loreto and Amazonas.

It contains a labor force of 213,000, representing 70.4 % of the labor force of the Departments of Loreto and Amazonas.

**The western sector** includes the cities of Bagua, Imacita, and Santa Maria de Nieva. The population in this area is predominantly of Andean origin, although there are also indigenous populations belonging to the Aguaruna ethnic groups, which extend eastward from the Pongo de Rentema zone.

The economy is mainly based on the commercial production of rice under irrigation, as well as coffee, cocoa, tropical fruits, hard yellow corn, soybean, cassava, bananas, a variety of vegetables, achiote and other crops.

Livestock farming mainly takes the form of extensive and semi-extensive pasturing. There is little fishing, which makes an insignificant contribution to the departmental GDP. To the east, subsistence agriculture is combined with fishing, hunting and gathering of forest resources.

The Department of Amazonas produced 0.7% of the country's GDP in 1994. As regards the departmental GDP, agriculture, hunting and forestry contributed 3%, other services 23% and manufacturing approximately 17%.

The central sector's population is distributed among 300 small settlements situated along the rivers. The main population centers are Saramiriza, San Lorenzo, Lagunas, Barranca and Santa Rita.

Although the population in this sector is mainly made up of mestizo riverside communities, there are also indigenous populations belonging to the following ethnic groups: Aguaruna, Achual, Quichua (Pastaza), Urarina and Cocama – Cocamilla. The Cocama – Cocamilla occupy certain sectors of the Pacaya – Samiria Reserve.

The economy is weak and based on five principal activities:

- Agriculture, mainly involving four products (bananas, cassava, rice and corn), together with a vast range of vegetables and native fruits primarily grown for subsistence consumption. Any surplus produced is sold on the regional market.
- Fishing: this is the principal activity in the area, due to the presence of the Pacaya - Samiria National Reserve, which produces 60% of the fish catch in the Amazon lowlands (DIREPE, Loreto 2000).
- Forest extraction: entailing logging of timber trees with high commercial value (cedar and mahogany). Non-timber forest products are extracted mainly at a subsistence level, with the exception of *aguaje*, huasai, and various species of medicinal plants, including *sangre de grado* (dragon's blood) and cat's claw, which are destined for the regional market

- Oil: this activity is carried out in Block 8X, which is operated by the company Pluspetrol and located in the Pacaya - Samiria National Reserve.
- Hunting: this activity supplements the income of rural populations, despite the fact that hunting areas are located at considerable distances from mestizo and indigenous settlements.

**The Eastern Sector**, whose hub is the city of Iquitos, has the largest population density in the Amazon-Marañon Corridor. Its population totals 400,000, of which 87% reside in urban areas, with the remaining 13% living in mestizo riverside communities.

The economy in this sector is mainly sustained by services and commerce, with limited industrial development, linked mainly to forestry activity, construction, and soda water bottling plants.

The Allpahuayo Mishana Reserve (57,663 hectares) was created because of its exceptional biodiversity. Among other things, it contains *varillales*, which are forest ecosystems on white sand.

Fishing provides the main source of animal protein for riverside populations in Loreto. Fishing is carried out over a very wide area with small boats and simple implements.

The estimated annual fishing output for 2000 was 42,000 tons of fresh and dry-salted fish.

In 1999 logging yielded 202,067 cubic meters of logs, primarily in the form of valuable hardwoods, such as cedar and mahogany. In the Department of Loreto there are 34 registered industrial timber companies, of which 28 are sawmills, five manufacture plywood, and one produces wood veneer.

Loreto accounts for 4.9% of Peru's GDP. Oil provides 68% of the departmental GDP (crude and byproducts), while agriculture, hunting and forestry make up 13%, industry 4%, and fishing 1%. After hydrocarbons, the most productive sector is tourism, accounting for 14% of departmental GDP.

#### **1.4.4 Human capital availability and needs**

##### **Supply of professionals**

The National University of the Peruvian Amazon (UNAP), with a postgraduate school and fourteen faculties, provides professionals in the areas of agronomy, forest sciences, chemistry, medicine, law, administration, accounting, economics, international business, tourism, biology, food engineering, education, humanities, animal husbandry, nursing, systems engineering, pharmacy, biochemistry, and dentistry.

Iquitos Private University (UPI) supplies professionals in six fields: law and political sciences, obstetrics, civil engineering, administration, accounting, and communication sciences.

The recently founded Toribio Rodríguez de Mendoza National University in the department Amazonas, has four faculties: agroindustrial engineering, nursing, tourism and administration, and primary education.

The overall supply of human resources at the regional level is affected by the shortcomings that beset the regional university system, which produces professionals with a poor technological and scientific grounding. The system is largely oblivious to the needs for the development of a competitive culture.

##### **Supply of mid-level technical personnel.**

In the department of Loreto, the National Industrial and Labor Training Service (SENATI), the Peruvian Institute for Business Administration (IPAE), the Pedro A. Del Águila Hidalgo Higher Technology Institute, Emilio Romero Padilla Higher Institute, and the Loreto Higher Institute of Teacher Training, train technical personnel in a variety of areas: mechanics, electricity, education, computers, and carpentry.

In the Department of Amazonas, the Utcubamba Higher Institute of Teacher Training, the Lonya Grande Higher Technological Education Institute, the Bagua Technological Institute, and the Tsamajain Technological Institute train technical personnel in the areas of crop and livestock farming, nursing, accounting, computer science, mechanics, and secretarial skills.

There are also a number of technical colleges: 16 agricultural colleges; six industrial colleges; one commercial college; and one medical school.

In sum, the regional supply of professionals and technicians is sufficient to meet the basic operating needs of bioindustry. However, it will be necessary to hire trained specialists from outside the region to perform tasks that involve the use of advanced technology.

##### **Potential demand for human capital**

It is essential to have professionals and technicians for the primary production phase, transformation, administration and management phase, as well as the generation of science and technology.

To stimulate activities connected with the sustainable utilization of natural resources, there is a need for agricultural technicians, aquaculture specialists, forestry technicians, laboratory technicians, and engineers who are familiar with modern farming technologies. These professionals will make

it possible to improve crop yields, the management of ponds and lakes for fish production, integrated pest management, and cloning. Also necessary are specialists in ecological and scientific tourism, as well as other areas.

Fish production, for instance, requires permanent technical support from experts for selection of species to be cultivated, artificial reproduction techniques, pond and lake management, as well as integrated management of larvae, fry, and young and adult freshwater species with commercial value.

A second group of experts will be required in the area of industrial processing. There is a need for engineers and technicians who are capable of managing industrial processes, developing new products, are alert to market needs and the constraints imposed by environmental sustainability.

A third group of human resources is needed in the area of business management; this means professionals with 21st-century management skills, who are at ease with modern management instruments, able to identify market trends, are forward-looking, and have strategies for placing products in the appropriate market niches; in other words, business leaders.

It is essential to have the support of qualified researchers who focus on the generation and/or adaptation of technological packages in line with the needs of the market.

#### **1.4.5 Support infrastructure for bioindustry.**

##### **River Transport**

The main communication system in the Department of Loreto is the network of large rivers that extend for an overall distance

3,000 kilometers and are navigable year-round.

This network is connected to the Pacific Ocean via two routes: by river as far as Yurimaguas; and, also by river, as far as Saramiriza. From these points, on there is road access to the main cities and ports on the coast. The Atlantic Ocean is reached along the Amazon River (see Figure 5)

A large portion of river transport capacity (launches, barges, tugs, outboard boats) is idle. It is estimated that 70% of vessels are idle due to lack of cargo traffic (Iquitos to Pucallpa; Iquitos to oil-producing zones; Iquitos to Yurimaguas).

##### **Land Transport**

There is limited road infrastructure in Loreto. The Iquitos-Nauta highway extends 105 km, of which 60 km are paved; the remainder is unpaved.

There are plans to pave the Yurimaguas - Tarapoto - Moyobamba road (304 km) over the next five years.

In the Department of Amazonas, most transport is by road; although a paved highway crosses the department connecting it to cities on the coast (Chiclayo and the port of Paita), and to the Department of San Martín.

In the interior of the department there are unpaved roads that need maintenance and improvement.

The road from Bagua to Santa Maria de Nieva (approximately 105 km) is unpaved, while the road from Santa Maria de Nieva to Saramiriza (approximately 75 km) is still at the planning stage.



## Ports and docks

Iquitos is the most important river port in the country, and ranks as an international port.

Loading and unloading services are hampered when the river changes its course. In the low-water season boats have to stop short of the docks and be unloaded using barges.

During the high-water season medium-draught ships with a capacity of 8,000 to 15,000 tons are able to dock.

The port's loading and unloading infrastructure is limited, and it currently receives only one boat a month from Brazilian ports on the Atlantic Ocean.

There are docks in almost all the cities and towns located on the banks of the Amazon, Marañón, and Huallaga rivers (Yurimaguas, Lagunas, Nauta, San Lorenzo, Barranca, Saramiriza), but they lack loading and unloading infrastructure.

Feasibility studies have been conducted for a port terminal in the Saramiriza sector of the Marañón River and for docks at Lagunas on the Huallaga River.

## Airports

Iquitos has an international airport, although international commercial flights (which connect to Miami) have been temporarily suspended.

There are domestic commercial flights that link Iquitos to Pucallpa, Tarapoto, Trujillo, and Lima.

The airport currently handles six commercial flights a day, which are operated by Aero Continente, Aviandina and Tans. There are daily charter flights (10-20 tons) by the Peruvian Air Force (FAP) planes hired by a

company called Transber. Arrow Air operates irregular flights from Miami, generally bringing spare parts for oil companies.

In the interior of the department of Loreto there are airfields at San Lorenzo and Felix Torres for small, six- to twenty two-seater passenger planes.

After Iquitos, the main airports in order of importance are Ciro Alegria (paved, for military use), Bagua, and El Valor (in Amazonas).

## Energy

In the department of Loreto, Iquitos is the hub of electricity generation, transmission, distribution, and commercialization. Electricity is thermally generated and installed capacity is 35 MW.

The industrial rate is US\$0.15 per Kw/hour, which is 50% higher than the rate in Lima (US\$0.10 Kw/hour).

Most riverside communities do not have a permanent supply electricity.

The cost of electricity is lower in Bagua, Amazonas (US\$0.12 Kw/hour), which is supplied by two small hydroelectric plants (Cumba and El Muyo) that generate a total of 8 MW for the whole province. In the Province of Condorcanqui, on the other hand, energy is heat-generated, which makes it expensive.

Nauta, Lagunas, San Lorenzo, Santa María de Nieva, and other small towns have heat-generated energy supplied by small generating sets which are operated for a few hours each day.

Much of the north Peruvian oil pipeline passes through the Amazon-Marañón corridor. The pipeline starts at Saramuro, from where the oil is driven by 10 pumping

stations to Bayóvar on the Pacific coast. Studies have been concluded with a view to connecting the pipeline to an oil-producing zone in Ecuador in order to pump out the crude.

### Telecommunications

The cities of Iquitos, Nauta and Bagua have adequate telephone services with Internet access. However there is a conspicuous difference between these places and other small towns and villages in the corridor, some of which only have one telephone booth for the entire population.

Nonetheless, Osiptel (the telecommunications authority) is carrying out a project to install an internet 'café' and telephone exchange in the capital of each district throughout the country, which will significantly improve the service.

### Situation of other important services.

Iquitos has the best water distribution and sewage infrastructure in the Department of Loreto. In other population centers there is only partial coverage. There is no supply of potable water in the Province of Condorcanqui (Amazonas), where inhabitants use untreated water from natural sources. There are also no installed sewage systems in this area. In the province of Bagua, water distribution and sewage systems are in place but deficient.

Access to public health services in the Department of Amazonas is extremely limited. These services use healing methods based on pharmacological products; there is very little use of traditional medicine based on plants or native products found in the region.

According to the health census of 1992, the health system infrastructure in the Department of Amazonas consisted of 130

health posts, 16 health centers, and two hospitals. The same source indicated that the Department of Loreto had 83 health posts, 11 health centers and 10 hospitals.

In the areas of science and technology, apart from the universities and colleges mentioned above, there are also public institutions such as IIAP, the National Institute for Agricultural Research (INIA), the Veterinary Institute for Research in Tropical and Highland Areas (IVITA), and Traditional Medicine Institute (IMETRA) which are currently operating.

There are also NGOs, as well as investment and development projects that provide assistance on specific research efforts.

### 1.4.6. Biological Resources

The biological resources of the Amazon-Marañón corridor should contribute to the development of this part of the Amazon region through sustainable use. This process will help to shift from subsistence farming to commercially and export oriented agriculture. The process also entails identification of alternative solutions and foreign markets for products with commercial potential.

Following is a list of the main plant and animal species found in this part of the Amazon region, which have been identified based on their bioindustry potential (see Annex 2).

### Food and Tropical Fruits

Aguaje (*Mauritia flexuosa*), anona, caimito, camu-camu, sugarcane, cocona, copaiba balsam, chanca piedra, charichuelo (*Garcinia macrophylla*), cherimoya, bell apple, guaba, humari, loro micuna (*Macoubea guianensis*), yellow sapote, mocambo, yellow passion fruti, cashew, mullaca, naranjo podrido (*Parahancornia peruviana*), ñejilla fruit, olla de mono, huasai, perfume guayaba, pijuayo fruit, pineapple, pitahaya, sapote, supay

fruit, timareo, ushum, uvilla, vino huayo, ivory palm, cassava, yumanasi.

### Medicinal Plants

Achiote, ayahuasca, Peru balsam, chuchuhuasi, clavohuasca, horsetail, guanabana, guayusa, huito, ipururo, jergonquiro, cheeseweed, ojo de pollo, pacunga, paico, piñon, piri piri, pusanga caspi, quinine, remo caspi, retama, sanango, dragon's blood, totumo, cat's claw, yahuar piri piri (*Eleutherine bulbosa*)

### Flowers and Tropical Foliage

Orchids, gingers, bromeliads, heliconias, ferns, palms.

### Fish for Human Consumption

Acarahuazu, arawana, boquichico, cahuara, chambira, carachama, corvina, doncella, dorado, gamitana, lisa, maparate, paco, paiche, palometa, ractacara, stingray, red-tailed sabalo, sardine, tucunare, julilla, xenocara, zungaro.

### Live Ornamental Fish

Cichlids (añashua, apistogramma, cupid bujurqui, discusfish, festivum, jurupari, crenicara), corydoras, gymnotus (electric eel, lungfish, macana), myleus (metines), pimelodids (achara, bagre listado, zungaro, bombie beecat, bocon, bolt cat, cunchi fierro, cahuara, churero, novia, pimelodella, redtail catfish), loricariidae (farlowella, loricaria, otoncinclus, pleco, shitari, xenocara), serrasalmidae (piranhas), stingrays, tetras (auratus, catalina,

characidium, chilodus, pechito, tetra), and other species, such as arawana, gamitana, frederici, leporinos, shirui, chambira, etc.

### Fauna

Majaz, ronsoco, sajino, huangana, venado, sachavaca, monkeys, coati, añuje, armadillo, jaguar, ocelot, puma, huamburusho, snakes, snails, caimans, parrots, pihuichos, chirricleses, macaws, turtles, frogs, and, insects.

### Oleaginous fruit

Aguaje, ungurahui, pijuayo fruit, peanuts, habilla.

### Biocides

Barbasco, requilla (*Guarea sp.*), curare, abuta.

### Plant fibers

Panama hat plant, chambira palm, casha vara, piassava, tamshi (*Thoracocarpus*), huambe.

### Spices and dyes

Achiote, palillo, chili pepper, huito, basil, sachaculantro, canela moena.

### Other plants and trees for handcrafts and industrialization

Leche caspi, fig, rubber tree, rosewood, tupamaqui (*Neea sp.*), huayruro, ivory palm, shacapa (*Pariana sp.*), vaca ñahui (*Mucuna huberi*).

## 1.5 MARKET PERSPECTIVES

### 1.5.1 International trends

In the past twenty years, the exports of developed countries have been composed of goods and services with a mainly scientific base, while exports of raw materials

obtained from natural resources have declined.

Over the same period the participation of manufactured goods in the overall imports of the OECD grew rapidly from 55% to 76%, while raw materials dropped from 44% to

22%. Within the manufacturing sector, those not based on natural resources were the most dynamic, rising from 49% to 71%.

This style of production has generated a major impact on global ecosystems, causing global warming, depletion of biological diversity, and loss of cultural identity or cultural uniformity, in addition to asymmetric development and external and internal social polarization.

The international response has been to try to ensure sustainable development through trade regulation, treaties -on biological diversity (CBD) climate change (FCCC), among others- increases in preferences for organic and sustainable products (green seal, ecological seal, forest certification, etc.)

In the context of this new international order it is clear that the country's production systems must be restructured or drastically changed to boost the supply of natural products in response to the new opportunities that are presenting themselves.

### **1.5.2. Potential foreign markets for Amazonian products.**

#### **Organic Food**

The organic food market is worth approximately US\$20 billion per year, and is mainly concentrated in Europe (45.4%), United States (40.6%), and Japan (12.7%).

The participation of organic products in international markets is small (1.25% of total foodstuffs sold across the world). However, the rising trend in demand indicates that organic food will account for almost 20% of food consumption in 2010. Europe will continue to be a leading consumer.

#### **Tropical Fruits**

The United States buys almost 40% of the world's imports of tropical fruits and the European Union 42%.

The European Union is a more sophisticated market, with high standards of living and demand for a broader range of products with stringent quality standards and a predisposition toward consumption of tropical fruits.

Quality standards in the European market center on four fundamental aspects: product standardization; taste quality; sanitary standards and strict limitation of residues on food; and recyclable packaging.

The main exports of tropical fruits to the European Union in terms of volume are pineapple (40.8%), melon (22.8%), avocado (15.9%), guayaba and mango (15.5%), watermelon (3%) and papaya (2%).

#### **Medicinal Plants**

International trade in medicinal and aromatic plants moves some 440,000 tons per year. In 1996 sales totaled US\$1.3 billion, of which the European Union (18.5%) and the United States (10%) absorbed one third.

Additionally, trade in aromatic substances like cinnamon and cloves amounted to US\$9.6 billion in 1995. The United States and the European Union combined absorbed 60% of this trade (US (25%), EU (40%)). The Asia-Pacific region also consumed a large amount (20%). Peru's participation in this market is virtually insignificant.

We estimate that the world trade in medicinal plants in the year 2010 will reach US\$100 billion, which provides an idea of the magnitude and potential of this market.

## Flowers and Tropical Foliage

The United States, Canada, European Union and Japan are all markets for tropical flowers. The first three are supplied mostly by Latin American countries, while Japan, Eastern Europe and the former Soviet Union are beginning to be supplied by South East Asia.

The main producers in the world are Hawaii, Costa Rica, Ecuador, Colombia and a number of Caribbean islands.

Ecuador and Colombia possess infrastructure for traditional flower growing, along with inexpensive skilled labor and specialized technical personnel. By 1988, Colombia's annual flower exports came to US\$450 million, while Ecuador exported around US\$125 million. This also gives an idea of the potential revenues and employment opportunities that these activities can generate. Demand for foliage is similar to that for tropical flowers. The United States, Germany and the Netherlands are the world's leading importers of tropical foliage, accounting for 70% of the roughly US\$195 million in sales that this industry generates each year.

## Fish Products

### Fish for human consumption

Current world consumption is 65 million tons per year (13 kg per inhabitant per year), primarily derived from marine species. Countries are aware that marine ecosystems are under threat, mainly from world climate change, high levels of pollution, and biodiversity loss. Accordingly, they are attempting to steer to consumption towards aquaculture products.

In developed countries there is a preference for cultivated species, primarily crustaceans and mollusks, while in developing countries

the preference is more towards small fish species with little commercial value.

Another trend is the growing importance of fresh fish. Fresh fish still enjoys a bigger market share than processed products.

Markets have become more flexible, and new products and species have established niches (Brazil exports gamitana meat at US\$20/kg. Brack A, 2000).

### Live Ornamental Fish

Trade in live ornamental fish has increased since 1980. The wholesale trade is currently estimated at US\$900 million, while the retail is worth US\$3 billion (just in live animals for aquariums).

Asia accounts for more than 50% of world demand for ornamental fish. Singapore is the main exporter of ornamental fish, followed by the United States, Hong Kong, Japan, Malaysia, the Czech Republic, Israel, the Philippines, and Sri Lanka.

Keeping pet fish is a pastime more common to industrialized countries, as they are relatively expensive to purchase and maintain. The main importers are the United States, Japan and Europe, particularly Germany, France, and the United Kingdom. In 2000 and 2001, exports of ornamental fish from the Department of Loreto came to US\$1,093,000 and US\$1,301,000, respectively, making the third non-traditional export category, behind wood and sheet metal industry.

## Wildlife and Wild Animal Breeding Technologies

The international market for wildlife has three basic categories: live animals as pets, furs, and meat for human consumption.

The international trade in wild animals is smaller than it used to be, due to a series of

restrictions imposed on commercial hunting. Many producer countries of tropical wildlife are facing increasingly aggressive campaigns to limit the use of furs of wild animals whose natural populations are on the verge of extinction.

However, there is a large domestic and international market for wild animals as exotic pets.

The use of wild animals to produce meat to sell for human consumption is an activity that has found niches in developed country markets.

Examples include the red deer in New Zealand, the kangaroo in Australia, and the African ostrich. All produced under managed conditions. This constitutes an additional option in the area of wild animal breeding technologies.

Sales of wild animals are regulated by the Convention on International Trade in Endangered Species of Wildlife and Flora (CITES). Annex 5 shows the market linkage of the more representative species with bioindustry potential found in the Amazon-Marañon corridor.

The table below shows the levels of international trade in wildlife for 1990.

**World imports of wildlife and their products (by units)**

<b>Year</b>	<b>Live primates</b>	<b>Feline furs</b>	<b>Live Parrots</b>	<b>Reptile hides</b>
1990	26,631	44,810	933,672	9,132,623

Source: Use and conservation of Amazon wildlife, ACT, 1995.

## **1.6 IDENTIFICATION OF PRODUCTS WITH COMMERCIAL POTENTIAL**

### **1.6.1 Selection criteria for product lines with market potential.**

a) **Biodiversity in the Amazon.** The resources upon which bioindustrial development is based should come from the biodiversity resources native to the Peruvian Amazon, due to the fact that these constitute the principal strength of the region, and the competitive strategy and development of markets will be based on new products derived from those resources.

For commercial reasons, non-native products could be incorporated if that would strengthen the economic and social viability of the project.

b) **Market linkages.** In order to make their commercialization easier the resources promoted will be those that are better established in markets, at either the domestic or the international level.

c) **Availability of production technologies.** Existence of known technologies for production of raw materials and processing of products will be a factor in favor the selection of resources.

d) **Ecological sustainability of cultivation and breeding.** Output of raw materials that does not originate from natural stocks should be based on



sustainable cultivation and breeding systems.

e) **Ecological sustainability of extraction from natural stocks.**

Output of raw materials that originate from natural stocks should be based on sustainable systems for the management of resources their in their natural environment.

f) **Integration with other production activities.**

Integration of production activities within and among production lines will be a factor in favor for the selection of a given resource.

Furthermore, as investment in the industry and market demand increase, processes such as freezing, freeze-drying, pulverization, or atomization could be introduced.

The bioindustry in fruits could use resources originating from sustainable plantations (camu-camu, pijuayo fruit, yellow passion fruit, anona, pineapple, humari, cocona), or from natural stocks (aguaje, huasai, camu-camu, ungurahui).

Products that are easy to manufacture and require no technology and little investment are as follows:

### 1.6.2 Product lines selected.

We have targeted the following groups of resources to be integrated into similar, mutually complementary production lines:

#### Line 1: Tropical fruits

The possibilities for the development of Amazon fruit crops are based on: the great variety of species in the region, adding value to those known and new fruits, the introduction of new species to the market, breaking from the local market into the national market and, eventually, into foreign markets and processing by small and medium sized companies.

Due to their perishable nature and market regulations imposed on fresh produce, barring a few exceptions, Amazon fruit cannot be sold in its natural state. There are several processes that fruit and vegetable crops may undergo.

Some of the processes applied using technology on a small scale are canning in syrup; canning in brine; canning in acidified brine; and canning in vegetable oil. Other products include marmalades, jellies, syrups, desserts, candies, nectars, sauces, purees, and pickled products.

Marmalades made from aguaje, camu-camu, cocona and papaya; sweets made from starfruit and cashew nuts; syrups made from guayaba (with or without seeds); nectars from starfruit, cashew nuts, aguaje, soursop, ungurahui, pineapple and camu-camu, amongst others.

Widespread promotion is needed to open up niches for new products in the gourmet market. The idea is to 'sell' the image of ecological goods that are produced in a clean environment without artificial additives or preservatives.

#### Value chain and available technology

The value chain for tropical fruits begins with their collection and/or harvest, and continues through the agro-industrial process until it reaches the consumer end.

Each component must function correctly to achieve an overall harmonious process, otherwise the fruits' nutritional value, shelf life, quality and price could be affected.

Current harvesting techniques are inefficient and generate high levels of waste. Aguaje, for instance, is harvested by cutting down the tree and only 37.5% of the fruit is used because not all the fruit is ripen. In the case

of camu-camu, harvesting is achieved by collecting all the fruit, whether or not it is ripe enough for marketing.

Tropical fruits are highly perishable, and the contributing factors to the high rate of fruit loss between collection/harvest and purchase by the final consumer include the high temperatures in the area, varying levels of ripeness, inadequate containers and packaging, poor roads, lack of packing infrastructure, and others.

As the majority of production or cultivation areas are along riverbanks, a viable technological alternative would be having a mobile stockpiling point (a vessel) that moves by river among the different fruit production and collection points. It could be fitted with refrigeration equipment to preserve the fruit until it reaches the port for distribution or the processing plant.

Tropical fruits that arrive at the port could be either distributed to be consumed fresh on the local or domestic market or exported.

## **Line 2: Hydrobiological products.**

The international fish market for human consumption is becoming increasingly undersupplied, with an increasing supply of frozen white fish and a preference for fish caught in non-polluted waters.

In other words, international demand for fish is not being satisfied and that supply breach is increasing.

On the other hand, demand in the international market for ornamental fish is even growing, particularly in the United States, Europe, and Asia. World trade in this area is worth approximately US\$45 billion and the Asian participation is 68% of that market.

Peru has been exporting ornamental fish for 40 years. Exports have increased from

US\$2.5 million in 1994 to US\$98 million in 2001.

There is a clear opportunity to launch and develop aquaculture in the region, promoting large-scale fish breeding for human consumption. This infrastructure could also be used at no extra cost to breed ornamental fish, and it would be possible to have a higher sustainable supply in both products.

The differentiation factors in the supply of these products that will help them to be competitive in the market are the availability and nature of water sources, the overall environment (climate, space, the great variety of species), as well as breeding in waters that are not contaminated with pesticides or chemical fertilizers.

Therefore, the supply of ornamental fish should entail a range of properly identified species and an adequate quarantine process, in order to bypass intermediary markets, such as Miami and Los Angeles.

As regards fish for human consumption, the supply should be composed of species such as paiche, doncella, zungaro, boquichico, gamitana, paco, and others in order to ensure an acceptable supply to the commercial market and a permanent supply of frozen and smoked fish.

Lima could serve as a test ground prior to launch on the international market.

### Value chain and available technology

The value chain for hydrobiological resources begins with extraction in the wild or harvesting at fish farms. In the case of ornamental fish there is no experience with reproduction processes in controlled environments, since at present they are caught in the wild. As such, it is important to design and develop plans for adequate management in the wild and/or

development of aquaculture. Value can be added after they are caught by adequately identifying species, ensuring quality processes in quarantine phases, maintenance and conditioning, packaging and shipment.

Once caught, fish for human consumption have to be quickly gutted and frozen, in order to maintain a high level of freshness by the time they reach the consumer or the processing plant. The product can then be filleted and prepared in a number of ways: plain, breaded or pre-cooked.

In order to enter the frozen fish market, the region must have sufficient freezing infrastructure to ensure shipment with the required quality.

Consumer demand for fish that comes from unpolluted waters, requires that the value chain incorporate, not only processing, but also steps taken to ensure that larvae and fingerlings are kept in waters free of toxic waste. The meat from fish such as gamitana, boquichico, and others, as well as the meat left on the backbone of the paiche, can be ground up for processing into patties and presented according to the market requirements of different economic strata.

In addition, other processing byproducts could be used to make balanced animal food.

There are specialists (IIAP, UNAP) and the necessary management technologies to develop fish farming available in the region, but a clear legal framework to promote this activity properly is needed.

### **Line 3: Flowers and tropical foliage.**

The treatment applied to flowers and tropical foliage, also grouped into a single category, depends on the dynamics of the flower markets.

Although certain markets prefer particular varieties, in general, the buyers come from

Europe, Japan and the United States, where the purchasing power of the consumer is higher and tradition encourages the use of these goods, often as gifts.

Importers look for sources of supply that offer a wide range of species, as opposed to one or two.

The Amazon region has the potential to be a highly diverse source of supply of exotic flowers, such as heliconias, bromeliads, gingers, ferns, araceas, palm trees and orchids amongst others. The Amazon region has a huge variety of these species for which there is usually demand in Europe in a specialized segment of that market.

### Value chain and available technology.

This line will be based exclusively on cultivation of plants under controlled conditions.

Value can be added mainly during the cultivation phase, and later through post-harvest handling techniques, containers packaging, transport, and storage.

### **Line 4: Medicinal plants.**

With respect to medicinal plants, studies show that there is a steady rise in use of natural products for therapeutic purposes. In 1998, international trade in medicinal and aromatic plants came to US\$1.6 billion and it is estimated that in 2010 it will reach US\$100 billion.

The behavior of the international market indicates that we should make considerable efforts in the areas of research and development, as well as to offer more new medicinal species, in order to make it more attractive.

We should also take into account resources that native communities have been using

for centuries, whose properties could be verified through in-depth research and clinical studies, either with assistance from international cooperation agencies, or through strategic alliances with prestigious laboratories. In this way, it would be possible to patent and market the principal active agents of such plants.

Along with changes in demand there have been other changes on the side of supply. There has been a steady decline in the supply of wild plants because collectors are turning to other sectors in search of better opportunities. This trend is particularly noticeable in the more industrialized countries.

In response to this trend, greater and more intensive cultivation of medicinal plants is being promoted, where conditions are appropriate. This behavior has opened an opportunity in the market which the region could take advantage of.

Although efforts to cultivate certain plants have failed or been unfeasible, it is broadly accepted that cultivation is the only way to ensure the long-term sustainability of such species and to supply the increasing demand.

Therefore, only by producing value-added products from these medicinal plants, will it be possible to overcome economic limitations of these cultivars.

#### Value chain and available technology

Value adding is generated from the beginning of the production chain, in order to guarantee a high-quality product that can meet the standards demanded by consumers.

A wide array of increasingly complex technologies for processing exist, ranging from those that are labor-intensive to those that use robot technology to make the active ingredients for production of capsules,

tablets, coated capsules, atomized dry extracts, lyophilized extract or liquid extract.

The range of possible products with value added includes, inter alia, medicines, creams, ointments, suppositories, dyes, syrups, oils, and infusions.

#### **Line 5: Plant fibers**

The possibilities for development and export of plant fibers found in the Amazon are geared to trends in the international markets of home furniture, gifts, and handcrafts. Asian countries, and to a lesser extent, Central America, currently dominate this market.

At present, the rising demand for these products is the result of increased environmental awareness among end consumers in developed countries, who are turning to rustic decorative products made with renewable natural resources and intensive manual labor.

Such products can be purchased in large department stores and through mail-order catalogues. Although these products are considered 'rustic', the market demands conformity to certain quality standards in the treatment of fibers used, design, and finish. This entails semi-industrial development at the production stages as well as skilled labor.

A plan to develop this line of products will involve labor-training programs, product designs tailored to market tastes and fashions, and use of raw materials processed using techniques that conform to international standards.

The plants species that could be used in this area include the Panama hat plant (hats, utility handcrafts), chambira palm (utility handcrafts), casha vara (furniture), piassava (brooms, insulation material), *tamshi* and huambe (furniture, utility handcrafts).

In the project area, the raw material for these resources is harvested entirely in the wild. However, cultivation technologies have been developed for some of these plants, with a view to industrial production. Also other technologies have been developed for the sustainable harvest of these plants in the wild.

#### The value chain and available technology

The raw material for these products will come from managed natural populations and plantations cultivated by small farmers.

Value-adding technologies include post-harvest management, processing, and manufacture of items for the market.

In general, these technologies are highly rudimentary, and mainly rely on unskilled labor. Accordingly, intensive training measures are needed to improve all phases of production (drying, bleaching, dyeing, weaving and polishing). The goal will be to obtain better quality products and prices, depending on the intrinsic characteristics of the raw material, product type, and demand.

#### **Line 6: Wild animal breeding technologies**

Traditionally, wild animals have been hunted in the Amazon forests, either as a source of protein for local populations, to supply the fur and leather trade, or for export as pets.

At present, the wild animal market is supplied by hunters and poachers.

Animals from the Peruvian Amazon have been exported since the beginning of the second half of the 20<sup>th</sup> century, resulting in the trade of large volumes of wildlife products and living animals until commercial hunting was banned in 1975.

Today, the only exportation permitted is of wildlife products that come from animals hunted for food, principally the hides of the sajino, huangana and venado.

There is also unmet demand for animals as pets, such as macaws, parrots, turtles, insects, caimans, lizards, frogs, monkeys and various bird species.

Bioindustry based on wild animal breeding technologies will require the development of commercial systems for breeding wild animals, with a view to production and export of meat that is free from chemical substances, processed and manufactured furs, and pets.

#### The value chain and sustainable technology

Successful wild animal breeding technologies mainly entails skilled management of reproduction, feeding and hygiene processes. There are already markets for many wildlife products, particularly pets, insects and furs. However, markets need to be developed for other animals, such as those that would be bred for their meat.

Depending on the animal in question, we will select available technologies, either for the treatment or manufacture of furs and other intermediate goods, or to produce objects and merchandise for the end consumer.

Processing technologies for furs and meat are widespread in industrialized countries. Therefore, in implementing this line we will be able to choose from a wide range of possibilities, depending on size, product type, availability of resources and other factors.

## 1.7 BIOINDUSTRY STAKEHOLDERS

### 1.7.1 Bioindustry stakeholders

Development of bioindustry brings together diverse players with different perceptions, interests and responsibilities.

Within this scenario, we have organized the stakeholders according to interest groups: government, businessmen and business organizations, producers' organizations, indigenous and mestizo communities, nongovernmental organizations and strategic allies, analyzing them according to a matrix of stakeholders attached in Annex 3,

The interests of the governmental organizations in the Amazon-Marañón corridor are to:

- a) Further the peace agreement between Peru and Ecuador;
- b) Attract investment and generate employment;
- c) Develop a productive base that is integrated with the market;
- d) Register trademarks and patents;
- e) Conduct scientific and technological research and provide technical assistance;
- f) Implement sustainable development and environmental management policies to ensure the preservation and sustainability of biological diversity resources;
- g) Train human resources
- h) Help improve quality of life in the Amazon Marañón corridor.

Businessmen and the business organizations are interested in the development of favorable conditions for private investment as well as generation of wealth and employment.

Producers and their organizations are interested in raising productivity and access to market with attractive prices.

Indigenous and mestizo communities are interested in ensuring respect for their property and development of opportunities that permit them to improve their economic position and overcome poverty and inequity.

Nongovernmental organizations want to help local communities to fulfilling their aspirations, and secure financing for biobusiness.

Strategic allies, such as international cooperation agencies and multilateral organizations want to help to:

- a) Increase knowledge concerning biological diversity;
- b) Preserve biological diversity, the environment, and freshwater sources;
- c) Develop local capacities
- d) Implement business originating from bioindustry.

### 1.7.2 Roles

Development of a competitive bioindustry is a complex task that involves the efforts of diverse stakeholders.

It is, however, evident that active and committed participation on the part of the State, the private sector, NGOs and native communities, amongst other social players, will be pivotal to the success of the plan's objectives. We see a specific role for each of these players.

#### The State

As the leader of the country's development process, the State has the task of organizing and promoting measures to facilitate Peruvian society's involvement in projects designed to improve socioeconomic conditions while conserving the biological diversity and the environment.



In order to develop bioindustry, its main effort should be to implement public policies to improve productive factors, such as: access to credit, capacity building and scientific and technological research; improvement of port infrastructure, extension of electricity and telecommunications coverage, and access to new information technologies.

Therefore, efforts should center on environmental management and the creation of adequate conditions for investment, such as stable macroeconomic policies, implementation of incentive schemes, political stability, stable regulatory frameworks, and having strong decentralized institutions.

### **Companies and producers**

The private sector should assume the challenge of boosting competitiveness based on technological innovation and access to new technologies, as well as organization of production and commercialization along the entire chain value. This can be achieved by creating business clusters.

At every level, businessmen, producers and commercialization agents should commit to sustainable utilization, preservation of the environment, and conservation of biological diversity. They should also cement the export capacity of the region.

### **Civil society organizations and NGOs**

Civil society, cultural and nongovernmental organizations should be vigilant in monitoring the public and private administration of natural resources in order to protect and ensure access to them, safeguard respect for property and the equitable distribution of the benefits derived from their use.

NGOs should also facilitate access to financial and non-financial services,

(training, technical assistance and legal counseling), as well as help strengthen the local management capacities of communities, and encourage the conservation of natural resources.

### **Indigenous communities**

The proposed area of influence contains indigenous communities, who are the possessors of ancient knowledge and the owners of large areas of the Peruvian Amazon region.

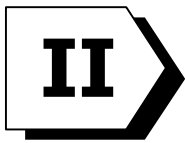
Community members must interact with representatives of producers and traders according to strict bargaining guidelines based on equity.

### **Strategic allies**

International and domestic cooperation agencies should help each other to successfully implement scientific, technical, social, and economic initiatives.

It is crucial for the region to secure and increase flow of cooperation in areas of scientific and technological development as well as human capacity building, with the assistance of multilateral organizations (IDB, CAF, World Bank, UNDP, UNEP, EU, UNIDO) and bilateral cooperation programs.

However, it is also important to have the support of organizations interested in bioindustry business such as the project incubators network (UNCTAD, UNDP, USAID, COSUDE, Holland, TNC, WWF, international cooperation agencies), risk and environmental dividends quantification agencies (BV-SERM, INNOVEST, SAM) and Ecofund (UNEP FI, GAS - ETH, TCF - IFC, EEF - MIF, LAC network, NV - WRI).



**STRATEGIC  
FRAMEWORK  
FOR BIOINDUSTRY**

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## 2.1 SUSTAINABLE DEVELOPMENT VISION FOR THE REGION

### 2.1.1 Development vision for the Amazon region <sup>2</sup>

*"Regional communities integrated with the rest of the nation exist in a climate of legal stability and manage their development in a sustainable manner, combining the human, economic, environmental and political dimensions. The quality of their people is sustained by an integrated education in universalism and a high degree of awareness of the value of natural resources. Their sustainable productive system is based on bioindustry, which makes use of traditional and new technologies in the framework of an efficient administration of their territory."*

This aspiration for the Amazon has been expressed in the vision for the development of the Amazon up to 2022, which focuses on four dimensions:

#### 1. The human dimension

The Amazon region is valued for the quality of its people, who have different cultural backgrounds and is a factor in their development alternatives. The population's needs are satisfied and continuity is guaranteed by an educational system, which is linked to the environment and open to universalism.

#### 2. Economic dimension

The Amazon region possesses a productive system, which is sustainable, profitable, consensualized, integrated, and supported by services, rules, and infrastructure. Native and introduced technologies are applied with synergy. Bioindustry stimulates the regional economy.

#### 3 Environmental dimension

The region has a consolidated awareness of the value of natural resources, maintains the balance of ecosystems, and controls pollution. Population is equally distributed and integrated between the rural and urban areas, each administering their territory in a sustainable manner.

#### 4. Political and institutional dimension

The Amazon region is composed of communities that are integrated with the rest of the country in a climate of legal stability and manage the sustainable development and political affairs of the region in an independent manner.

### 2.1.2 Basic development strategies for the northeastern zone of the Peru-Ecuador border<sup>3</sup>

The border development strategy proposes interaction between the **spatial strategy, the integration strategy, the natural resources utilization strategy, and the assistance strategy**. In this context, the spatial strategy should be applied based on land management, according to ecological and economic zoning principles.

#### **Spatial strategy**

The plan provides for three imaginary areas:

- A **critical strip** running parallel to the border, where measures will be implemented to enable border populations find ways to ensure their well-being.
- An **intermediate support area** that encompasses district capitals and other potential poles of development between the border and the Marañón-Amazon corridor, including its areas of influence.

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<sup>2</sup> Source: Peruvian Amazon Research Institute (IIAP)

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<sup>3</sup> Source: Peru-Ecuador Binational Border Development Plan.

Since this area will act as a kind of 'bridge', investment will be needed to enhance the productive and urban capacity within it.

- A **remote support area**, which encompasses the main, current and future, towns in the Amazon-Marañon corridor. Its function is to provide socioeconomic support to the other areas. Accordingly, investment will be needed to develop an economic corridor whose hubs are Mazan, Iquitos, Nauta, Saramiriza, Nieva, and Bagua.

### **Integration strategy**

It has two dimensions:

- East-west integration along the Iquitos-Jaen corridor multi-modal transport systems to connect to the road network on the northern coast and thereby ensure access to the Pacific Ocean, and strengthen the route to the Atlantic Ocean
- North-south integration based on road axes connecting Loja, Jaen, Bagua, Santa Maria de Nieva, and Saramiriza (transport corridor 4), and Mendez, Puerto Morona, and Santa Maria de Nieva (transport corridor 5), as well as connecting with the southern river network.

### **Natural resources utilization strategy**

The region recognizes that its resources with the greatest potential are its biological diversity and freshwater sources, which, combined with its cultural diversity and the knowledge of its indigenous peoples, constitute comparative advantages for tourism development and bioindustry under a scheme that encourages increased added value and ecosystems conservation.

Minerals and hydrocarbons will be used applying clean technologies, thereby avoiding adverse impacts on ecosystems, as well as furnishing additional funds to finance growth of the productive base.

In addition, it is understood that economic circuits will expand from the micro level to the macro level, creating a progressively integrated network.

### **Support strategy**

This is designed to consolidate regional identities, foster scientific research into new technologies, and strengthen socioeconomic institutions and organizations, helping to support increasing productivity in a sustained manner.

Increased human capacities and qualities, together with adequate environmental and financial management, will help to generate competitive advantages.

## **2.2 SWOT ANALYSIS**

Bioindustry in the Peruvian Amazon region suffers from one crucial problem: a low or non-existent market presence. This results in a low level of resource use, reduced impact on the regional economy, and little interest on the part of the population in conservation.

The principal causes of this weak market presence include, a lack of organization among producers, absence of value-adding technologies in the production-processing chain, and lack of knowledge of market niches.

This, in turn, is the consequence of the absence of financial services and non-financial services to promote production, such as lines of credit and technical assistance to strengthen the value of the chain process. In addition, complex rules make access to funds extremely difficult.

The non-incorporation of technologies in the value chain is the result of a lack of available technology adequate to Amazonian ecosystems and the profile of producers.

The causes can be found in the low institutional capacity, lack of specialized human resources, lack of investment in research and development, absence of modern technology in companies, and the dissociation between research centers and the companies.

In this context, the findings of the SWOT analysis on bioindustry development in the Amazon-Marañón corridor can be summarized as follows:

### 2.2.1 Strengths

- The huge diversity of flora and fauna resources found is derived from multiple ecological belts and ecosystems that provide a highly varied and permanent supply of organic and exotic forestry, food and medicinal products.
- The existence of abundant alluvial ecosystems with a high potential of fertile soils for setting up environmentally sounds production systems using species adapted to these conditions.
- Cultural diversity and knowledge of traditional technologies that are potentially advantageous for the development of bioindustry and the generation of added value.
- The cultural identity of indigenous populations that contributes to the preservation of biodiversity.
- The existence of protected natural areas, as well as biophysical and cultural resources that constitute potential

advantages for the development of ecological, adventure, and scientific tourism, as well as the preservation of biological diversity.

- Law 27037 on Investment Promotion in the Amazon Region.
- The strategic position of the zone with respect to the Manaos-Iquitos and Saramiriza-Paita corridors. This axis is included in the recently signed Amazonian Strategic Alliance between Brazil, Peru and Ecuador.

### 2.2.2 Opportunities

- Investment programs arising from the Peru-Ecuador peace agreement aimed at the creation of socioeconomic conditions for regional development.
- The existence of a Plan on Sustainable Development of the Amazon Region, which places priority on the generation of added value for biodiversity resources and recognizes the importance of territorial organization in the Marañón-Amazon corridor.
- The existence of coca substitution programs, which promote the introduction of profitable crops with an established market.
- The growing interest of international markets in natural curative products derived from alternative medicines and traditional sources, as well as increasing consumer interest in organic products.
- The increasing concern with the conservation of biological diversity; a fact that favors international agreements as well as scientific and financial cooperation programs for the countries with large biodiversity.

- The international availability of different financing sources to promote sustainable development.
  - The National Agreement that creates the National Policy on Competition (Article 16) and the Policy on Sustainable Development and Environmental Management (Article 18).
  - The creation of the Peru Biotrade Committee as partner in the BIOTRADE /UNCTAD Initiative.
  - The adoption of the Andean Trade Preference Act (ATPA).
  - The regionalization process currently underway.
- natural resources and new biodiversity products.
  - Insufficient services for collection and refrigerated storage of products, especially at urban distribution centers and airports.
  - Deficient port, transportation, electricity and communication services.
  - Shortage of qualified human resources to take on the challenge of developing value chains and incorporating biotechnology in the cultivation and processing stages; to manage companies; and to market biodiversity products.
  - Non-standard quality in supply of goods and services

### 2.2.3 Weaknesses

- The area of influence of the strategic plan consists, generally speaking of both, poverty and extreme-poverty areas, with subsistence economies and lack of basic services.
- Low agricultural output, poor levels of processing, and minimal technology.
- The predominantly extraction-oriented and non-sustainable regional production systems characterized by low levels of profitability and high levels of informality.
- Lack of strong public and private institutions to support small and medium-sized businesses in the region or to foster programs on financing, promotion, modernization, and efficient productive and commercial management with an eye to the market.
- Insufficient financial resources allocated to the research and development of

### 2.2.4 Threats

- Deforestation and depletion of Amazonian biodiversity resources due to changes in land use and deficient environmental control systems.
- An increase in unplanned migrations due to the opening up of new points of access into the Amazon region.
- Genetic piracy through illegal removal of genetic material from the country.
- Drug trafficking
- Extreme neo-liberalism economic policies displace national productions
- The negative impact due to the introduction and poor management of genetically modified organisms.



## 2.3 BIOINDUSTRY DEVELOPMENT STRATEGIES

### 2.3.1 Vision

The vision expresses the aspiration of the Amazonian communities to establish a sustainable productive base supported by the bioindustry. That aspiration is formulated as follows:

*"In 2022, bioindustry will constitute one of the pillars of sustainable development of the Amazon-Marañón Corridor, achievable through the positioning of competitive productive lines in the local and international markets with the participation of both medium-sized and large productive units; helping to preserve ecosystems, incorporate diverse cultural expressions, and improve quality of life."*

### 2.3.2 Mission

The mission to be completed by both the State and the civil society in implementing this strategic plan is as follows:

*The State and the Amazonian societies of Peru provide solutions to the low levels of employment and investment by promoting added value for biodiversity resources, with a view to the production of competitive goods and services and incorporation of appropriate technologies, such as biotechnology and information technology, in order to place products in target markets. These entities must strive to contribute to improving quality of life based on a strategy of sustainability and distribution.*

### 2.3.3 Overriding Objective

In coordination with the Regional Strategy on the Biological Diversity of the Amazon Region, the overriding objective of the Strategy for the Development of Bioindustry in the Peruvian Amazon is to:

*To establish competitive productive lines based on the biological diversity of the Amazon region.*

### 2.3.4 Values, principles and Ideals

Biological diversity is a legacy that holds strategic value for current and future development of the Amazon region and the area of influence of the bioindustry strategy.

Given biodiversity's systemic and dynamic character in time and space, and considering its evolving processes and components, the management of biological diversity demands a high level of responsibility to ensure utilization without destruction.

Given that the level of knowledge about ecosystems in the Amazon is low and the use of natural resources is often not considered sustainable, it is necessary to set down values, principles and ideals that provide a framework for attitudes toward the sustainability of biological diversity and the environment.

#### VALUES

- **Equity:** rights that correspond to each and every member of civil society, and serve to determine the proportions in which responsibilities, benefits, costs and opportunities offered by biodiversity should be distributed.
- **Respect for diversity:** Respect for others, nature and cultural rights.
- **Intergenerational responsibility and commitment** of all stakeholders.

- **Generational Solidarity** between the members of a society based on a relationship of mutual recognition of interdependence and common interests.
- **Authenticity:** Be true to oneself.
- **Proactiveness:** Strengthening sound attitudes of resolution and response in all stakeholders.
- **Honesty:** Creating a culture of honesty and respect for public and private property.

## PRINCIPLES

- **Temporary administration:** Each generation is responsible for the administration of resources of the Amazon region.  
  
After utilization it should be possible to return the area in question to its original state.
- **Efficiency of use:** Utilization should not risk the capacity for the regeneration and reproduction of biological diversity and should generate wealth with the least possible use of the resource concerned.

## IDEALS

- Respect for the material existence and spirituality of sustainable growth
- Small is beautiful
- The human being is a part of nature and responsible for its fate

- Cultural diversity is intimately linked to biological diversity and is a source of answers.
- Knowledge is wealth and tacit, non-codified knowledge is the main sustainable competitive advantage. The indigenous and mestizo communities are the possessors of this knowledge

### 2.3.5 Strategic axis

There are four axis that should be integrated and drive the strategic objectives contained in the vision of bioindustry development in the Peruvian Amazon.

These strategic themes are:

- Quality of the products in the diverse processes of the value chain.
- Efficient management and strategic administration of production and commercialization.
- Quality of human resources and their capacity for innovation.
- Environmental efficiency in the value chain process.

### 2.3.6 Strategic objectives

The long-term development of bioindustry will be grounded in the achievement of the following strategic objectives:

<b><u>Overriding objective:</u></b>		
<b>To establish competitive productive lines based on the biological diversity of the Amazon region</b>		
	<b>Strategic Objectives</b>	<b>Indicators</b>
1	Incorporate within bioindustry raw materials originating from managed natural stocks and efficient production systems.	◆ Managed production units.
2	Develop new and better targeted products with the highest possible value added, using Amazonian biodiversity resources.	◆ Basket of goods with added value at the production stage ◆ The number of SME's in clusters that produce goods with value added.
3	Develop markets for targeted products originating from different Amazonian biodiversity species.	◆ Number of Bioindustry products placed in the market.
4	Develop the competitiveness of bioindustry in order to boost productivity in a climate of macroeconomic stability and integration with domestic and international economy.	◆ Examples of technological innovation ◆ Examples of seized commercial opportunities.
5	Create suitable conditions to stimulate an attractive environment for investment in bioindustry.	◆ Quality of the environment in which companies operate ◆ Examples of investment attracted by bioindustry.

### **2.3.7 Strategic Lines**

The dynamics of social, economic, environmental and political processes at the national level and the main trends in the international market make it essential to recognize the need to be willing to think in strategic terms about ways to update and maintain the effectiveness of strategies to make bioindustry development in the Amazon region a reality.

The strategic lines identified for each of the proposed strategic objectives offer the most effective routes for engineering the shift from an extraction-oriented mindset toward a competitive bioindustry in the region.

**Strategic objective 1: Create suitable conditions to stimulate an attractive environment for investment in bioindustry**

The Peruvian Amazon region is a patchwork of ecosystems consisting of an active river system influenced by the tectonics of the Andes, and contains a biological megadiversity that constitutes potential raw material for the food industry, pharmaceuticals industry and other sectors.

Traditionally extraction-based methods are used to take advantage of forestry products and aquatic ecosystems. The population puts pressure on the natural resources, which have to provide the raw materials for a growing demand for goods and services. At the same time, they are also affected by waste produced by consumers and production processes, threatening the productive capacity of different ecosystems while perpetuating a subsistence economy

**Policies**

The Peruvian State, at all levels, with the active participation of Amazonian communities, should stimulate the development of a productive base for the sustainable use of biological diversity, integrating the local level with the international context and preserving essential ecological processes.

The Peruvian State promotes the sustainable use of biological diversity resources, respecting the territories of the indigenous communities as well as their real and ownership rights and recognizing traditional knowledge.

**Unleashing strategies**

**Strategy 1.1** Orient production based on economic and ecological zoning, forest zoning, organization of the fishing industry, and agricultural zoning, in order to ensure the economically and environmentally efficient production of a targeted basket of biodiversity products.

**Strategy 1.2** Improve access to non-timber, wildlife and livestock, and fishing, and aquacultural resources under management plans and efficient production systems by streamlining administrative procedures and updating of national regulations.

**Strategy 1.3** Strengthen organizations of producers and traders of raw materials through training programs in business management and development of a culture of quality.

**Strategy 1.4** Encourage the traditional financial system to make available promotional lines of credit through the creation of collateral security funds for small rural businesses in order to reduce risk.

**Strategy 1.5** Reintroduce technical assistance services that encourage the use of technologies for producing raw materials that have a minimal impact on the environment.

**Strategy 1.6** Stimulate and provide incentives for technological innovations and adoption of new technologies for production and commercialization of raw materials by involving universities and research institutions in the task of improving production through the creation of competition funds for research and development projects, internships, and thesis.

**Process strategies**

**Strategy 1.7** Adopt certification mechanisms in diverse production processes.

**Strategic objective 2: Develop new and better targeted products with the highest possible value added, using Amazonian biodiversity resources.**

The Amazonian culture possesses practices for the use of different forestry products based on ancient knowledge for satisfying the material and spiritual needs of the indigenous and mestizo communities. The growing demand for natural products offers the opportunity to create wealth, and to improve supply quality.

**Policies**

The Peruvian State, in cooperation with the private sector, encourages value adding in the utilization of flora, wildlife and micro-organism resources, as well as other components of biological diversity, dovetailing ancestral knowledge with global knowledge and articulating the rural logic with the market in the areas of capital size, technology, human resources, production scale, etc.

**Unleashing strategies**

**Strategy 2.1** Orient production and value-added development for targeted products in order to improve efficiency in the value chain.

**Strategy 2.2** Improve product profiles and ensure the technical standardization of goods that Peru already exports as well as those sold on the domestic market.

**Strategy 2.3** Promote organization of SME's into clusters along the value chain, facilitating access to training in post-harvest technologies, processing and commercialization.

**Strategy 2.4** Stimulate technological innovation and the adoption of new processing technologies, by involving universities and research institutions in the task of improving production through the creation of competition funds for research and development projects, internships, and theses, as well as through promotion of credit lines.

**Strategy 2.5** Create collateral security funds for SME's in bioindustries and clusters, in order to encourage the traditional financial system to make available promotional credit lines.

**Strategy 2.6** Stimulate private investment in scientific and technological services as well as in mobile river stockpiling centers, post-harvest handling, containers, packaging, storage and conditioned transportation.

**Process strategies**

**Strategy 2.7** Encourage the incorporation of the value-adding processes, such as biotechnology, freezing, liofilization, pulverization or atomization, and others along the value chain.

**Strategy 2.8** Stimulate investment in scientific and technological services, such as product certification and quality control.

**Strategy 2.9** Determine the appropriate technology needs for bioindustry in the region.

**Strategic objective 3: Develop markets for targeted products originating from different Amazonian biodiversity species**

Globalization creates demanding markets in terms of quality and competitive prices to satisfy the needs of a growing worldwide population. The Amazonian ecosystems contain high levels of biological, physical and cultural diversity, possess huge potential for production, and their forests are key components in the balance of the environment. Accordingly it is essential to develop a market that recognizes the necessity to preserve diversity and the environment, in order to safeguard this great natural gene bank and freshwater source.

**Policies**

The Peruvian State, in strategic alliance with the private sector, promotes the development of national and international markets for biodiversity products, generating a supply of competitive, diversified and targeted products with added value.

The Peruvian State assists SME's in the process of building up export capacity, by modifying laws, providing training, and taking part in trade fairs and technical or trade missions.

**Unleashing strategies**

**Strategy 3.1** Develop the domestic market through the introduction of a basket of bioindustry products in food security and health programs.

**Strategy 3.2** Identify target bioindustry markets at the international level: NAFTA, European Union, Asian countries, Andean Community, MERCOSUR, among others.

**Process strategies**

**Strategy 3.3** Encourage an export culture by promoting, inter alia, trade missions to potential markets.

**Strategic objective 4: Develop the competitiveness of bioindustry in order to boost productivity in a climate of macroeconomic stability and integration with domestic and international economy**

The adverse prevailing socioeconomic conditions in the country and the region demands a response capacity on the part of the State to create employment. Furthermore, private investors need conditions that permit the generation of wealth and the ability to compete in a globalized economy. The great comparative advantage of possessing vast areas of forest and a huge network of rivers demands that efforts be made to create a competitive bioindustry.

**Policies**

The private sector, with the help of the Peruvian State, develops a competitive bioindustry in the Amazon region, with a view to establishing itself on the national and international markets and stimulating the creation of jobs.



**Unleashing strategies**

**Strategy 4.1** Develop a supply of products that meet international quality standards.

**Strategy 4.2** Improve access to financial resources.

**Strategy 4.3** Update capacities for technological innovation and the assimilation of new technologies in companies and research institutions.

**Process strategies**

**Strategy 4.4** Promote ongoing technological innovation in businesses.

**Strategy 4.5** Strengthen human capital through the training, skills updating and specialization.

**Strategic objective 5: Create suitable conditions to stimulate an attractive environment for investment in bioindustry**

One of the most conspicuous features of globalization is the importance throughout the world of foreign direct investment. In many countries, this gives rise to technology transfer and the potential development of new and better inputs, provided the recipient of the investment has the capacity to absorb the technology. This, however, can also lead to the presence of negative external factors, such as the displacement of local or domestic goods and an increase in the production costs. Given this panorama, we propose policies and strategies designed to promote investment in bioindustry.

**Policies**

The Peruvian State creates favorable conditions for private national and international investment, facilitating the generation of wealth to increase the well-being of all Peruvians.

The Peruvian State respects the real and property rights, creates a predictable regulatory framework and ensures transparency in public decisions.

**Unleashing strategies**

**Strategy 5.1** Create the Bioindustry Development Agency (ADBIO) as the specialized body, co-managed with the private sector to promote and oversee the development of this area.

**Strategy 5.2** Strengthen institutions at the regional and national level, encouraging their necessary decentralization, credibility and political stability for bioindustry promotion.

**Strategy 5.3** Create a system of fiscal and financial incentives specially tailored to bioindustry promotion.

**Strategy 5.4** Improve the financial capacity and access to credit at the regional level through the creation of a revolving fund for investment for bioindustry.

**Strategy 5.5** Implement mechanisms to attract diverse forms of financing, such as credit lines, venture capital funds, business development funds, competition funds, and business angels.

**Strategy 5.6** Improve the availability and quality of road infrastructure, as well as that connected with air and river transport, energy, and communication.

**Strategy 5.7** Strengthen producers' organizations in the chain value

**Strategy 5.8** Promote the capacity for technological innovation and absorption on the part of companies, to improve the technology innovation capacities of research

institutes in the framework of a renewed national policy on science and technology.
<b>Strategy 5.9</b> Improve access to markets through the development of economic corridors.
<b>Strategy 5.10</b> Create Information Centers in support of SME's. These centers should be integrated with the Peruvian Amazon Biological Diversity and Environmental Information System (SIAMAZONIA) and contain comprehensive information about organization, financing, training, legal matters, technology, technical assistance, markets, etc.
<b>Strategy 5.11</b> Interact efficiently with strategic allies to implement businesses associated with bioindustry, such as project incubator networks, risks classifiers and environmental dividends quantifiers, as well as ecofunds.

<b>Process strategies</b>
<b>Strategy 5.12</b> Improve the technological innovation and adaptation capacities of research institutes in the framework of a renewed policy on science and national technology.
<b>Strategy 5.13</b> Facilitate access to specialized information on bioindustry.
<b>Strategy 5.14</b> Stimulate reinvestment in order to diversification output using biological diversity technological.
<b>Strategy 5.15</b> Eliminate obstacles that hinder the use of biotechnology in diverse value-adding production processes.
<b>Strategy 5.16</b> Make public production policies compatible and eliminate discrimination against non-traditional Amazonian products.
<b>Strategy 5.17</b> Promote the integration of the Amazonian region with the national economy through educational policies that emphasize the value of what is ours and economic policies that promote a basket of food and medicinal products that are mainly Amazonian in origin.

## 2.4 STRATEGY IMPLEMENTATION MECHANISMS

Social, economic and environmental processes express the interrelationship between culture diversity and biological diversity. For this reason, conservation and sustainable use of biological diversity should be managed using a systemic approach designed to build unity from diversity.

The development of a diversified economy based on natural resources requires stimulation of productive linkages for products with added value, services, and capital goods.

Bioindustry is an economic process based on a value chain of biological diversity products and its development requires a promotional organization -which we have called Bioindustry Development Agency (ADBIO)- with considerable capacity for business management and multi-sectoral coordination.

The main function of ADBIO will be to promote the development of biobusiness and high-impact innovation programs in the region, transferring technologies that help to improve the sustainable use of biodiversity resources in the Amazon and develop human resources and the productive capacity of the region in line with the demands of national and international markets.

Its mission will be to contribute to the innovation of markets for goods and services and the transfer technology, the purpose of adding economic value and encouraging the development of competitiveness in the region. ADBIO is conceived as a corporation governed by private law.

A strategic alliance between IIAP, the private sector, and universities will help to develop and strengthen ADBIO as an institution and stimulate its implementation of the strategic plan.

### 2.4.1 Plan of action

Generate the change from a weak productive base to a growing bioindustry requires considerable stimulation, starting with a priority strategies to kick-start critical success factors that may bridge the gap between the short term and the long term.

Accordingly, implementation of the Strategic Plan for the Development of Bioindustry over the next 5 years will include the following **unleashing measures**:

## UNLEASHING MEASURES IN THE AMAZON – MARAÑÓN CORRIDOR

**Incorporate within bioindustry raw materials originating from managed natural stocks and efficient production systems (Strategic Objective 1)**

**STRATEGY 1.1 Orient production based on economic and ecological zoning, forest zoning, organization of the fishing industry, and agricultural zoning, in order to ensure the economically and environmentally efficient production of a targeted basket of biodiversity products.**

ACTIVITIES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement ecological economic zoning, forest zoning, organization of fishing and agricultural zoning in the Amazon – Marañón corridor	INRENA, IIAP, DRA, DIREPE	GRL, GRA	Public Treasury, Oil Royalties

**STRATEGY 1.2 Improve access to non-timber, wildlife livestock, fishing, and aquacultural resources under management plans and efficient production systems by streamlining administrative procedures and updating national regulations.**

ACTIVITIES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Propose and institute norms and procedures for concerted administrative streamlining throughout the value chain, adapting them to the dynamics of the market	INRENA, DRA, DIREPE	GRL, GRA Producers, ADBIO	Public Treasury
2. Update land classification system to increase utilization capabilities	MINAG	INRENA, PETT	IC IDB
3. Encourage registration of property rights on the typical products in the region	INDECOPI	GRL, GRA UNIVERSITIES, IIAP	Public Treasury Oil Royalties IC
4. Create mechanisms of access to traditional knowledge and establish mechanisms for the rights of those who obtain them.	INDECOPI	GRL, GRA, Universities, IIAP, ONGs	Oil Royalties IC

**STRATEGY 1.3 Strengthen organizations of producers and traders of raw materials through training programs in business management and development of a culture of quality.**

ACTIVITIES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Provide training in raw material production and commercialization for leaders of producers and traders' associations.	MINAG, MITINCI, MINISTRY OF LABOR	NGOs, ADBIO	Public Treasury IC
2. Implement a program on organizational development, organization quality and credit culture.	MINAG, MITINCI, MINISTRY OF LABOR	NGOs, ADBIO Loreto and Amazonas Chambers of Commerce,	Public Treasury IC Private Funds

**STRATEGY 1.4 Encourage the traditional financial system to make available promotional lines of credit through the creation of collateral security funds for small rural businesses in order to reduce risk.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Adjust the rules of financial system on rural micro-business	SBS	Financial System	Public Treasury
2. Operate a guarantee fund	MEF	Financial System, GRL, GRA	Funds from Law N° 27037
3. Capacity to improve access to promotional credit	NGOs, IC, ADBIO	Loreto and Amazonas Chambers of Commerce, Business Associations	IC Public Treasury

**STRATEGY 1.5 Reintroduce technical assistance services that encourage the use of technologies for producing raw materials that have a minimal impact on the environment.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement training programs for extensionists.	Universities, IIAP, INIA, ADBIO	Producer unions	Public Treasury Hydrocarbons Law IC
2. Implement technology transfer and technical assistance programs.	DRA, DIREPE, INRENA, INIA, NGOs	GRL, GRA	Hydrocarbons Tax INCAGRO FONCODES
3. Operate competition funds to attract the installed capacities of research institutions and extension services.	CONCYTEC, IIAP	NGOs, Universities	Law 27037 Hydrocarbons Law

**STRATEGY 1.6 Stimulate and provide incentives for technological innovations and adoption of new technologies for production and commercialization of raw materials by involving universities and research institutions in the task of improving production through the creation of competition funds for research and development projects, internships, and theses.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Operate competition funds in technological innovation projects	CONCYTEC, IIAP	NGOs Private Companies	Public Treasury IC Oil Royalties
2. Create programs for research and development to facilitate the adoption of new technologies	CONCYTEC, IIAP	Universities Private Companies	Public Treasury Hydrocarbons Law
3. Establish centers of creativity and invention.	Universities, IIAP, ADBIO	CONCYTEC, Private Companies	Public Treasury Hydrocarbons Law
4. Implement technological intelligence programs.	ADBIO	CONCYTEC, CCL, CCA, Private companies	Public Treasury Hydrocarbons Law Private contributions
5. Facilitate registration of industrial property by decentralizing the service provided by INDECOPI.	INDECOPI	NGOS, Universities, IIAP, Private companies	Public Treasury



**Develop new and better targeted products with the highest possible value added, using Amazonian biodiversity resources. (Objective Strategy 2)**

**STRATEGY 2.1 Orient production and value-added development for targeted products in order to improve efficiency in the value chain.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Identify and promote a basket of targeted products.	Private companies, PROMPEX, MINAG, MINPE, MITINCI, ADBIO	GRL, GRA, Universities, IIAP, NGOS	Public Treasury IC

**STRATEGY 2.2 Improve product profiles and ensure the technical standardization of goods that Peru already exports as well as those sold on the domestic market.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Develop programs to adapt technical profiles for products in accordance with target markets.	Private companies CITE, ADBIO	MITINCI, PROMPEX, PRA NGOS, IIAP, Universities	Private funds IC Public Treasury
2. Encourage adaptation of technology to incorporate international standards in product lines with added value.	Private companies, MITINCI, ADBIO	MEF, NGOS, IIAP, Universities	Public Treasury Private Funds

**STRATEGY 2.3 Promote organization of SME's into clusters along the value chain, facilitating access to training in post-harvest technologies, processing and commercialization.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Offer incentives for the participation of SME's in clusters, in order to develop a value chain for the basket of targeted products	MEF, Private companies	NGOS	Public Treasury Private funds
2. Implement training programs on organizational development, export capacity, technological specialization, the quality culture, and credit.	Business Organizations ADBIO	NGO, CCL, CCA	IC, Private Funds

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**STRATEGY 2.4 Stimulate technological innovation and the adoption of new processing technologies, by involving universities and research institutions in the task of improving production through the creation of competition funds for research and development projects, internships, and theses, as well as through promotion of credit lines.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Establish competition funds for value-adding technology innovation projects.	CONCYTEC, IIAP	Universities, MITINCI, ADBIO	Public Treasury IC
2. Set up research and development programs to facilitate adoption of new value-adding technologies.	CONCYTEC, IIAP	Universities, Private Companies	Public Treasury IC Hydrocarbons Law
3. Create technological intelligence centers.	MITINCI	Private Companies Universities, IIAP, ADBIO	Public treasury IC
4. Implement value-adding technology intelligence centers.	IIAP, Universities, ADBIO	Companies	Public Treasury Petroleum Law
5. Facilitate registration of industrial property by decentralizing the service provided by INDECOPI.	INDECOPI	Private Companies, NGOS, IIAP	Private Funds NGOs
6. Operate credit lines for new technologies.	Financial System	MITINCI, ADBIO	FOPRIA

**STRATEGY 2.5 Create collateral security funds for SME's in bioindustries and clusters, in order to encourage the traditional financial system to make available promotional credit lines.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Adjust the regulations of the financial system in order to provide services to SMEs.	SBS	Financial System	Funds resulting from Law N° 27037
2. Operate a guarantee fund.	ASBAN, Council Banks, Rural Banks	Private Companies, NGOS ADBIO	Funds resulting from Law N° 270337
3. Provide training to improve access to promotional credit.	Business Unions, ADBIO	NGOS	IC Private Funds

**STRATEGY 2.6 Stimulate private investment in scientific and technological services as well as in mobile river stockpiling centers, post-harvest handling, containers, packaging, storage and conditioned transportation.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Manage competition funds to develop standardization processes and specialized information on value adding for biodiversity products.	IIAP, Universities	INDECOPI, NGOs, ADBIO	IC Public Treasury
2. Encourage the creation of lines of credit for quality control and advisory services, as well as mobile river stockpiling centers, post-harvest management, containers, packaging, storage and conditioned transportation.	Commercial Banks Municipal Treasury Rural Treasury Businessmen	Universities, IIAP, NGOs, ADBIO	Funds resulting from Law N° 27037

**Develop markets for targeted products originating from different Amazonian biodiversity species (Objective Strategy 3)**

**STRATEGY 3. 1 Develop the domestic market through the introduction of a basket of bioindustry products in food security and health programs**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Develop a supply geared to meeting demand generated by food security programs.	Entrepreneurs	PRONAA	Public Treasury
2. Develop and integrate the supply of natural products with public health programs	Entrepreneurs	MINSA	Public Treasury
3. Organize the distribution of the supply of natural products to points of sale for Amazonian products in the main domestic markets.	Entrepreneurs	NGO's	Private Funds IC
4. Apply a marketing plan targeting the domestic market and create an "Amazonian Image" that takes into consideration product definition, price, market, advertising, promotion, and distribution	Ministries, Entrepreneurs, ADBIO	GRL, GRA, Loreto and Amazonas Chambers of Commerce, ONGs	Public Treasury, Private Funds

**STRATEGY 3.2 Identify target bioindustry markets at the international level: NAFTA, European Union, Asian countries, Andean Community, MERCOSUR, among others**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Propose a national policy on foreign trade for Amazon bioindustry	CCL, CCA, ADBIO	Ministries, IIAP, Universities, ONGs	Public Treasury
2. Implement training and updating programs for entrepreneurs aimed at improving export capacities	PROMPEX, Business associations, ADBIO	RR.EE., ONGs, CCL, CCA	IC Private funds Public Treasury
3. Carry out market research programs	Business, PROMPEX-CESEM, ADBIO	IIAP, ONGs	Public Treasury
4. Implement a marketing plan to create an Amazonian-Andean image for the international market that takes into consideration product definition, price, market, advertising, promotion, and distribution	PROMPEX, Businesses, ADBIO	CCL, CCA, RR.EE.	Public Treasury, Private funds
5. Coordinate the supply of products from the Amazonian bioindustry with international biotrade initiatives	CONAM, PROMPEX	IIAP, entrepreneurs, ADBIO	Public Treasury IC
6. Carry out market intelligence programs	ADBIO, PROMPEX, BUSINESSES	IIAP, University, MITINCI	IC Private funds Public Treasury

**Develop the competitiveness of bioindustry in order to boost productivity in a climate of macroeconomic stability and integration with domestic and international economy (Strategic Objective 4)**

**STRATEGY 4.1 Develop a supply of products that meet international quality standards.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement business culture strengthening programs aimed at ongoing improvement of quality in the value chain	Business Associations, ADBIO	NGO, IIAP	Private funds IC
2. Carry out training programs on metrology, standardization and certification in the value chain.	INDECOPI, ADBIO	IIAP, Universities	Public treasury

**STRATEGY 4.2 Improve access to financial resources**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement financial intelligence programs.	Entrepreneurs, RR.EE., MEF, ADBIO	Ministries, Financial system	Private funds, Public treasury
2. Provide training to financial system operators on adequate analysis of environmental business and biobusiness quality.	Entrepreneurs, ONGs, ADBIO	Multilateral Entities, Financial system	IC, Private funds
3. Train entrepreneurs to identify business opportunities in the Amazonian bioindustry	Entrepreneurs, ADBIO	NGO's, Loreto and Amazonas Chambers of Commerce.	IC, Private funds
4. Channel financing towards bioindustry through credit lines, venture capital funds, business development funds, competition funds, and <i>business angels</i> .	Financial system	Business Associations, ADBIO	Public treasury FOPRIA

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**STRATEGY 4.3 Update capacities for technological innovation and the assimilation of new technologies in companies and research institutions.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement exchange programs for experts	CONCYTEC, Universities, IIAP	APCI, NGO	Public treasury IC
2. Organize trade missions	PROMPEX, Entrepreneurs, ADBIO	RREE, Associations	IC Private funds, FOPRIA
3. Execute technology transfer programs	CONCYTEC, Universities, IIAP	Business Associations, APCI, NGO, ADBIO	IC Public treasury
4. Carry out technological intelligence programs	Business Associations, Universities, IIAP, ADBIO	NGO	Public treasury IC
5. Promote the organization of the National System for Technological Innovation	Ministry of Education, MITINCI, ADBIO	Universities, IIAP, CONCYTEC, Business Associations	Public treasury
6. Establish Technological Innovation Centers (CITE) for bioindustry products	MITINCI	Business Associations, ADBIO	Public treasury IC
7. Organize fellowships for specialization programs	CONCYTEC, Universities	IIAP Business Associations, ADBIO	IC Public treasury



**Create suitable conditions to stimulate an attractive environment for investment in bioindustry (Strategic Objective 5)**

**STRATEGY 5.1 Create the Bioindustry Development Agency (ADBIO) as a specialized body, co-managed with the private sector to promote and oversee the development of this area.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Form a management consortium for the Bioindustry Development Agency (ADBIO) with a strategic alliance between IIAP, the private sector, and universities.	IIAP	Business Associations, Universities	Oil Royalties Private funds
2. Launch ADBIO	IIAP, Universities, Business Associations	PROMPEX, MITINCI	Public treasury IC

**STRATEGY 5.2 Strengthen institutions at the regional and national level, encouraging the necessary decentralization, credibility and political stability for bioindustry promotion.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Guarantee political stability in the region	Central Government	GRL, GRA	Public treasury
2. Increase participation of civil society by developing citizen oversight mechanisms and strengthening organizations: Associations, Unions, NGO's, Political Parties, regional fronts, others.	Central Government	GRL, GRA, CS, ADBIO	Public treasury
3. Ensure the stability of the regulatory framework and the national economy.	Central Government	GRL ,GRA	Public treasury, IC
4. Ensure effective decentralization of political power.	Central Government	CS, Political Parties, GRA, GRL	Public treasury, IC
5. Encourage separation of powers.	Central Government, GRA, GRL	CS, Political Parties	Public treasury, IC.

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**STRATEGY 5.3 Create a system of fiscal and financial incentives specially tailored to bioindustry promotion.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Create the Regulations for, and implement, Law 27037 (Law on Investment Promotion in the Peruvian Amazon).	MEF	GRL, GRA, ADBIO	Public treasury
2. Declare bioindustry to be a strategically important economic activity for the sustainable development of the Amazon region.	PCM	MITINCI, ADBIO	Public treasury
3. Provide special economic incentives for sustainable utilization of biologic diversity in the production of bioindustry goods and services.	MEF, MITINCI	Business Associations, ADBIO	Public treasury

**STRATEGY 5.4 Improve the financial capacity and access to credit at the regional level through the creation of a revolving fund for investment in bioindustry.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Operate a revolving fund for rural micro-businesses and SME's in bioindustry and <i>clusters</i> .	Development Bank	CTAR Loreto, ADBIO	Oil Royalties and Surplus Mineral Royalties Public treasury (Law N° 27037)

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**STRATEGY 5.5 Implement mechanisms to attract diverse forms of financing, such as credit lines, venture capital funds, business development funds, competition funds, and business angels.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Operate a national counterpart fund to attract and make viable financial mechanisms: bilateral debt exchange, venture capital, and other.	MEF	GRL, GRA, National Financial System, ADBIO	FOPRIA Public treasury
2. Implement training and capacity building programs in the National Finance System for ecofund management.	Financial System, ADBIO	Multilateral Entities, NGOs	Private funds IC
3. Establish the regulations and operating protocol for ecofunds	MEF	Financial System, ADBIO	Public treasury
4. Manage bilateral agreements (Peru-Italy Agreement) and other agreements with international entities	MEF	Ministry of Fishing, MINSA, MITINCI	Peru- Italy Agreement

**STRATEGY 5.6 Improve the availability and quality of road infrastructure, as well as that connected with air and river transport, energy, and communication.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Implement supplementary norms Seven, Eight and Nine and Articles 20 and 21 of Law N° 27037 on Investment Promotion in the Amazon Region	MEF	GRL, GRA, ADBIO	FOPRIA
2. Initiate land management planning in the Departments of Loreto and Amazonas	PCM	GRL, GRA	Public treasury IC Oil Royalties
3. Prepare feasibility studies on economic infrastructure services targeted in the Amazon-Marañon corridor.	GRA, GRL	Ministries, ADBIO	FOPRIA Public treasury Oil Royalties
4. Develop the energy supply for the Amazon-Marañon corridor, through preparation and implementation of pre-investment studies.	ELECTRORIENTE	Ministry of Energy and Mines, ADBIO	FOPRIA

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**STRATEGY 5.7 Strengthen producers' organizations in the value chain.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Stimulate the participation of SME's in clusters to strengthen the value chain of targeted products	Business Associations, ADBIO	Ministries	Private funds
2. Implement training programs on organization development, technological specialization, the quality culture and credit.	Business Associations, ADBIO	NGOs, Ministry of Labor	IC Public treasury
3. Provide training on value chain processes for leaders of producers and traders' associations.	MEF, ADBIO	GRL, GRA	Private funds IC

**STRATEGY 5.8 Promote the capacity for technological innovation and absorption on the part of companies, and improvement of the technology innovation capacities of research institutes in the framework of a renewed national policy on science and technology**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Manage competition funds in value chain technological innovation projects.	CONCYTEC, IIAP	Universities, NGO, Business Associations, ADBIO	IC Oil Royalties Public treasury, TT – IDB Program
2. Create research and development programs to facilitate adoption of new technologies in the value chain	CONCYTEC, IIAP, ADBIO	IIAP, Universities, NGO	IC Oil Royalties Public treasury, TT – IDB Program
3. Establish creativity and invention centers	CONCYTEC, ADBIO	Universities, IIAP	Public treasury IC
4. Carry out technological intelligence programs	CONCYTEC, Business Associations, ADBIO	Universities, IIAP	Public treasury IC
5. Establish technology innovation centers (CITE) for bioindustry products	CONCYTEC, MITINCI	Universities, IIAP, ADBIO	Public treasury o IC
6. Facilitate registration of industrial property through decentralization of the service provided by INDECOPI	INDECOPI	Universities, IIAP	Public treasury IC
7. Execute exchange programs for experts	CONCYTEC	Universities, IIAP	Public treasury IC
8. Organize trade missions	PROMPEX, RR.EE., ADBIO	Business Associations	Private funds Public treasury

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9. Implement technology transfer programs	INIA, IIAP	Universities	Public treasury
10. Launch the National System for Technological Innovation	MITINCI, CONCYTEC	Universities, IIAP, ADBIO	Public treasury IC
11. Implement fellowships for specialization programs	CONCYTEC	Universities, IIAP, ADBIO	Public treasury IC

**STRATEGY 5.9 Improve access to markets through the development of economic corridors**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Install economic and social infrastructure in the Amazon-Marañón corridor	Peru – Ecuador Bi National Plan National Entity	GRL, GRA, CCL, CCA	Peru – Ecuador peace agreement funds

**STRATEGY 5.10 Create Information Centers in support of SME's. These centers should be integrated with the Peruvian Amazon Biological Diversity and Environmental Information System (SIAMAZONIA) and contain comprehensive information about organization, financing, training, legal matters, technology, technical assistance, markets, etc.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Broaden SIAMAZONIA's comprehensive information service on organization, financing, legal matters, technology, technical assistance, markets, amongst others.	IIAP –ERDBA Secretariat, ADBIO	GRL, CRA, CCL, CCA	Peru-Finland bilateral agreement.
2. Implement information modules and Amazonian bioindustry incubators.	NGOs, ADBIO, IIAP	CCL, CCA	IC Private funds

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**STRATEGY5.11 Interact efficiently with strategic allies to implement businesses associated with bioindustry, such as project incubator networks, risks classifiers and environmental dividends quantifiers, as well as cofunds.**

MEASURES	RESPONSIBLE ENTITIES	ENTITIES INVOLVED	POTENTIAL FINANCING SOURCES
1. Organize the National Agenda for Biobusiness and Biotrade incorporating the basket of value-added Amazonian products	CONAM, PROMPEX, ADBIO	GRL, GRA, CCL, CCA, businesses	Public treasury UNCTAD IC
2. Incorporate the Biobusiness and Biotrade Agenda in the national cooperation agenda.	APCI – RREE , Multi sector Commission for IC International, ADBIO	CCL, CCA IIAP	Public treasury



### 2.4.2 Short and medium-term financing plan

In the short and medium term (that is the first five years), the objective is to ensure the viability of the strategic plan by securing financing to carry out the unleashing measures to develop bioindustry under four main programs:

1. Institutional development.
2. Human capacity building in business administration.
3. Financial administration for bioindustry.
4. Promotion of biobusiness.

The integrated efforts of these programs will allow us to attain the following results in the 1<sup>st</sup> stage (five years):

- Creation and operation of an autonomous institution specializing in bioindustry promotion – the Bioindustry Development Agency (ADBIO).
- Bioindustrial companies improve their productive organization, thus enhancing their ability to compete.
- A defined plan in place for financing bioindustry.
- Business plans for targeted development lines defined.
- Stakeholders informed about all the components of the value chain.
- Investment program for targeted products defined.
- National agreements defined on basic aspects of bioindustry.
- Emerging “Amazonian - Andean image” on the domestic and international markets.

The identified operating strategies institutional development and business capacities as key measures to stimulate bioindustry in the Amazon-Marañon corridor.

Table 1 shows the entities responsible for this process, as well as the timetable and budget that should facilitate the successful implementation of bioindustry in this corridor.

The objective in the second stage (years 6 to 20) will be to consolidate the development of bioindustry medium- and long-term measures proposed in the unleashing and process strategies.

### 2.4.3 Strategic evaluation system

Strategic evaluation is based on a monitoring and evaluation plan whose overall objectives are to:

- a) Monitor and measure progress in achieving the vision, completing the mission, and accomplishing the strategic objectives.
- b) Detect factors that hinder achievement of expected results, and suggest the necessary adjustments to redirect management of the bioindustry strategy.
- c) Serve as a tool for internal supervision and encouragement to efficiently complete the mission and accomplish the proposed objectives, as well incorporate feedback and lessons learned.

Execution of the plan of action will undergo internal and external evaluation.

**Internal evaluations** will be carried out annually at workshops attended by stakeholders involved in various activities in the value chain. The aim will be to evaluate progress in the development of bioindustry.

**External evaluations** are designed to assess the impact of the strategy and constitute a tool to follow-up and possible redirect activities in bioindustry strategy.

This will be accomplished through a socioeconomic assessment designed to measure the social benefits of the plan of action, as well as the costs and benefits with respect to the inventory of biodiversity resources or environmental variables, using as a frame of reference, the socioeconomic and environmental baseline study on the area of influence of the Strategic Plan.

The socioeconomic evaluation will cover intangible or not easily quantified costs and benefits included in the vision, and will describe the changes that have occurred and the Plan's impact in that respect.

These costs and benefits include changes in the environmental awareness of the population, business culture or attitudes, level of participation of target groups, and level of equity achieved both by the regional community at the national level, and the poorest sectors at the local and regional levels.

The external evaluation will be carried out in year five of the Strategic Plan on Bioindustry

**Table 1: Short- and Medium-Term Financing Plan**

PROGRAM	RESPONSIBLE	YEARS					US \$	RESULTS
		1	2	3	4	5		
1. Institutional development							Regional institutions established promoting bioindustry.	
a) IIAP- Private sector-University Alliance (IEU Alliance)	IIAP	X				100,000	Creation of ADBIO	
b) Creation of ADBIO	ADBIO		X	X	X	2,000,000	Implementation of the Strategic Plan for the short and medium term	
2. Development of human capacities in business administration							Improved business capacities	
a) Trade missions	ADBIO		X	X	X	100,000	Potential markets identified	
b) Technological innovation system	ADBIO		X	X	X	500,000	Technological updating	
c) Training program on business development	ADBIO		X	X	X	500,000	Businessmen trained	
3. Financial management for bioindustry							Financial strategy for bioindustry	
a) Design of competitive and renewable funds	ADBIO		X			100,000	Funds created	
b) Financial mechanisms	ADBIO		X	X	X	100,000	Available international funds (venture capital, ecofunds, etc.)	
4. Promotion of biobusiness							Prioritized business plans developed and implemented	
a) Information system	IIAP, ADBIO	X	X	X	X	500,000	Informed stakeholders	
b) Feasibility of the basket of targeted products	ADBIO		X	X	X	1,500,000	Investment program for prioritized projects	
c) Negotiation and agreement between the public and private sector	ADBIO, IEU Alliance	X	X	X	X	250,000	National agreements	
d) Market technological and financial intelligence	ADBIO		X	X	X	500,000	Strategic management	
e) Marketing Plan	ADBIO		X	X	X	1,500,000	Emerging Amazonian – Andean image	
<b>TOTAL FINANCING :</b>						<b>7,650,000</b>		

## Glossary of Terms and Acronyms

### Terms:

- Business Angels : Individual investors (and some institutions) with their own capital willing to invest on their area of expertise with a clear vision of value adding and benefit generation.
- Casave : Manioc or cassava flour tortilla
- Chonta : Edible palm tree tender stem
- Nasas : Basket traps for fishing purposes
- Purma : Succession stage of the forest as a consequence of eradication of primary forest
- Pucuna : Blowpipe measuring from 2 to 3 meters that shoots light and sharp wooden darts
- Restinga : Forest growth in alluvial flood plains areas with variable annual inundation periods (one to four months).
- Ribereños : Amazonian population living by the riverside

### Acronyms:

- ADBIO : Agency for the Development of Bioindustry
- ADEX : Exporters Association
- APCI : Peruvian Agency for International Cooperation.
- ASBAN : National Association of Banks
- BCRP : Central Reserve Bank of Peru.
- BIOTRADE : Stimulus Strategy for the Sustainable Commercialization of Biodiversity Products under the Convention on Biological Diversity
- CAF : Andean Development Corporation
- CAN : Andean Community
- CCA : Amazonas Chamber of Commerce
- CCL : Loreto Chamber of Commerce
- CBD : Convention on Biological Diversity
- CERPER : Peruvian Certifications
- CESEM : Business Services Center
- CITE : Technological Innovation Center
- CITES : Convention on International Trade in Endangered Species of Wildlife and Flora
- CONAM : National Council on the Environment
- CONCYTEC : National Council for Science and Technology
- COSUDE : Swiss Cooperation for Development
- CS : Civil Society
- CTAR : Transitory Regional Administration Council
- DIREPE : Regional Directorate for Fishing
- DRA : Regional Directorate for Agriculture

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▪	EAP	:	Economically Active Population
▪	ELECTRORIENTE	:	Eastern National Electric Company
▪	ENIEX	:	Foreign Technical Cooperation Entity
▪	ERDBA	:	Regional Strategy for Biological Diversity
▪	EU	:	European Union
▪	FCCC	:	Framework Convention on Climate Change
▪	FDA	:	Federal Drug Administration
▪	FONCODES	:	Compensation and Social Development Fund
▪	FONDEPES	:	National Fund for Fishing Development
▪	FOPRIA	:	Amazon Region Investment Promotion Fund
▪	GBIF	:	Global Biodiversity Information Facility
▪	GDP	:	Gross Domestic Product
▪	GRA	:	Amazonas Regional Government
▪	GRL	:	Loreto Regional Government
▪	IC	:	International Cooperation
▪	ICONTEC	:	Colombian Institute for Technical Norms and Certification
▪	IDB	:	Inter-American Development Bank
▪	IEU	:	IIAP-Business-University Alliance
▪	IGV	:	Sales Tax
▪	INADE	:	National Development Institute
▪	INASA	:	International Analytical Services
▪	INCAGRO	:	Innovation and competitiveness for Peruvian Agriculture
▪	INDECOPI	:	National Institute for the Defense of Competition and Protection of Intellectual Property
▪	INEI	:	National Statistics and Informatics Institute
▪	INIA	:	National Institute For Agricultural Research
▪	INRENA	:	National Institute of Natural Resources
▪	IPAE	:	Peruvian Institute for Business Administration
▪	ISC	:	Excise Tax
▪	ITP	:	Technological Institute for Fishing
▪	M.TRABAJO	:	Ministry of Labor
▪	MEF	:	Ministry of Economy and Finance
▪	MERCOSUR	:	Common Market of the Southern Cone
▪	MINAG	:	Ministry of Agriculture
▪	MINPE	:	Ministry of Fishing
▪	MITINCI	:	Ministry of Industry, Tourism, Integration and International Trade Negotiations
▪	MLO	:	Modified Living Organisms
▪	NAFTA	:	North American Free Trade Agreement
▪	NGO	:	Nongovernmental Organization
▪	OECD	:	Organization for Economic Cooperation and Development
▪	ONERN	:	National Office for Natural Resources Evaluation
▪	UNIDO	:	United Nations Organization for Industrial Development
▪	PCM	:	Presidency of the Council of Ministers
▪	PETT	:	Special Land Titling Project
▪	PROMPEX	:	Export Promotion Commission
▪	PROMPYME	:	Small and Micro-Business Promotion Commission
▪	PRONAA	:	National Program for Food Assistance

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▪	PT	:	Public Treasury
▪	PYME	:	Micro, Small and Medium Scale Enterprise
▪	RREE	:	Ministry of Foreign Affairs
▪	S.A.C.	:	Closed Stock Corporation
▪	SBS	:	Superintendence of Banking and Insurance
▪	SENASA	:	National Agricultural Health Service
▪	SENATI	:	National Industrial and Labor Training Service
▪	SIAMAZONIA	:	Information System for the Peruvian Amazon Biological Diversity and Environment
▪	SNI	:	National Industry Association
▪	SUNAD	:	Peruvian Customs Service
▪	TCA	:	Amazon Cooperation Treaty
▪	TNC	:	The Nature Conservancy
▪	TT-IDB	:	IDB Technological Transfer
▪	UNAP	:	Peruvian Amazon National University
▪	UNCTAD	:	United Nations Conference on Trade and Development
▪	UNDP	:	United Nations Development Program
▪	UNEP	:	United Nations Environment Program
▪	UPI	:	Iquitos Private University
▪	USAID	:	United States Agency for International Development
▪	WWF	:	World Wildlife Fund



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# ANNEXES

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## Annex 01:

# Definitions

### Species

In the biological sense, this term refers to a set of individual organisms with characteristics that distinguish them from other sets. Their common attribute is the ability to exchange genetic material through reproduction mechanisms and produce fertile offspring.

### Biodiversity

Biological diversity or biodiversity usually refers to the universe of plants, animals, microorganisms and existing ecosystems. For methodological reasons, it is subdivided into three categories: a) inter-specific diversity, which refers to a variation *between* species, b) intra-specific diversity or genetic diversity, which refers to variations *within* species; and c) ecosystem diversity, referring to the environmental variability that to a great extent conditions the occurrence, evolution and continued existence of the first two categories.

Recent developments in biodiversity concepts tend to include a fourth category called cultural diversity, which refers to all the different forms of expression of human life on the planet.

### Biotechnology

There is a broad array of biotechnologies with different techniques and applications. The Convention on Biological Diversity (CDB) defines biotechnology as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use."

Interpreted in this **broad sense**, the definition of biotechnology covers many instruments and techniques normally used in agriculture and food production. Interpreted in a **strict sense**, it refers to modern techniques for the manipulation of genetic information contained in the DNA of a species' chromosomes using molecular biology techniques and reproductive technology applications.

The definition covers an wide area of modern technologies developed towards the end of the 20th century, such as genetic mapping, gene marking and transfer, DNA profiling, cloning of microorganisms, plants, animals, and others.

As such, biotechnology has become a pillar and indispensable complement to modern bioindustry.

## **Bioindustry**

For the purposes of this document, we define bioindustry as *the biotechnological transformation process in the broad sense, applied under a sustainable approach to biodiversity resources to obtain products with the greatest possible added value.*

This implies that the bioindustry process extends to the entire value chain; that is, to those who process biodiversity resources, and those who, at the primary stage, ensure a sustainable supply of biological diversity resources.



## Annex 02:

# Common and Scientific Names of Plant and Animal Species

<i>English common name</i>	<i>Scientific name</i>	<i>Spanish common name</i>
<b>A) Birds</b>		
Curassow	<i>Mitu sp.</i>	Paujil
Macaw	<i>Ara spp.</i>	Guacamayo
Parakeet	<i>Brotogeris spp.</i>	Pihuicho
Parrot	<i>Amazona sp.</i>	Loro
Parrotlet	<i>Pionites spp., Touit spp., Piond</i>	Chirricles
Spix's Guan	<i>Penelope jaquacu</i>	Pucacunga

## B) Land Mammals

<i>English common name</i>	<i>Scientific name</i>	<i>Spanish common name</i>
Amazonian Tapir	<i>Tapirus terrestris</i>	Sachavaca
Armadillo	<i>Dasyopus spp.</i>	Carachupa
Brocket deer	<i>Mazama spp.</i>	Venado
Brown Agouti	<i>Dasyprocta variegata</i>	Añuje
Capybara	<i>Hydrochaeris hydrochaeris</i>	Ronsoco
Coati	<i>Nasua nasua</i>	Achuni
Collared Peccary	<i>Tayassu tajacu</i>	Sajino
Jaguar	<i>Panthera onca</i>	Tigre
Margay	<i>Leopardus wiedii</i>	Huamburusho
Ocelot	<i>Felis pardalis</i>	Tigrillo
Paca	<i>Agouti paca</i>	Majaz
Puma	<i>Felis concolor</i>	Puma
White-lipped Peccary	<i>Tayassu pecari</i>	Huangana

## C) River Mollusks

<i>English common name</i>	<i>Scientific Name</i>	<i>Spanish common name</i>
Apple Snail	<i>Pomacea maculata</i>	Churo

## D) River Mammals

<i>English common name</i>	<i>Scientific Names</i>	<i>Spanish common name</i>
Amazonian Manatee	<i>Trichechus inunguis</i>	Manatí
Coypu	<i>Myocastor coypus</i>	Nutria
Pink Dolphin	<i>Inia geoffrensis</i> <i>Sotalia fluviatilis</i>	Bufo de río

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**E) Fish**

<b>English common name</b>	<b>Scientific Names</b>	<b>Spanish common name</b>
Aguarunichthys	<i>Aguarunichthys torosus</i>	Bolt cat
Amazon Puffer	<i>Colomesus asellus</i>	Pez globo
Apistogramma	<i>Apistogramma sp.</i>	Apistogramas
Arawana	<i>Osteoglossum bicirrhosum</i>	Arahuana silver
Banded Sholvenosed Catfish	<i>Brachyplatystoma juruense</i>	Bagre listado
Barred sorubim	<i>Pseudoplatystoma fasciatum</i>	Doncella
Black Adonis Catfish	<i>Pterygoplichthys sp., Acanthycus hystrix</i>	Carachama
Black prochilodus	<i>Prochilodus nigricans</i>	Boquichico
Black-banded Marbled Catfish	<i>Zungaro zungaro</i>	Zungaro
Black-winged Hatchetfish	<i>Triportheus rotundatus</i>	Catalina
Bristle-nosed Catfish	<i>Ancistrus dolichopterus</i>	Xenocara
Brycon melanopterus	<i>Brycon melanopterus</i>	Sábalo cola negra
Bumpy-back Silver Dollar	<i>Stethaprion erythroptus, Metynnis maculatus, Mylossoma duriventris</i>	Palometa
<i>Cachama</i>	<i>Colossoma macropomun</i>	Gamitana
Cichlid	<i>Aequidens sp.</i>	Bujurquis
Common Bacu	<i>Pterodoras granulosus</i>	Cahuara
Corydoras	<i>Corydoras sp.</i>	Corys
Crenicichla	<i>Crenicichla sp.</i>	Añashuas
Cupid Cichlid	<i>Biotodoma cupido</i>	Biotodoma amazonas
Characidium	<i>Characidium sp.</i>	Characidium
Checkerboard Cichlid	<i>Crenicara punctulatum</i>	Crenicara
Discus Fish	<i>Symphysodom sp.</i>	Pez disco
Dorado	<i>Brachyplatystoma flavicans</i>	Dorado
Dwarf Dolphin Cat	<i>Ageneiosus sp.</i>	Bocon
Dwarf Marbled Catfish	<i>Microglanys poecilus</i>	Bombie beecat
Earth eater	<i>Satanoperca jurupari</i>	Jurupari
Electric Eel	<i>Electrophorus electricus</i>	Anguila eléctrica
Flag cichlid	<i>Mesonauta festivus</i>	Festivum
<i>Frederici</i>	<i>Leporinus friderici</i>	Friderice
Freshwater Angelfish	<i>Pterophyllum scalare</i>	Escalar
Hancock's Doradid	<i>Amblydoras hancockii</i>	Spinosisomomas
Hatchetfish	Carnegiella sp.	Pechito
Highwaterman Catfish	<i>Hypophthalmus edentatus</i>	Maparate
Horse-head Pimelodid	<i>Goeldiella eques</i>	Cunchi fierro
Julilla	<i>Anodus elongatus</i>	Yulilla
Knifefish	<i>Gymnotus sp.</i>	Macanas
Leporellus	<i>Leporinus sp., Rhytiodus sp., Leporellus vittatus</i>	Lisa
Multi-banded Leporinus	<i>Leporinus fasciatus</i>	Leporinos
Onelined Pencilfish	<i>Nannobrycon unifasciatus</i>	Auratus
Oscar	<i>Astronotus ocellatus</i>	Acarahuazú
Otoncinclus	<i>Otoncinclus sp.</i>	Otonciclos

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Pacu	<i>Myleus sp.</i>	Metines
Paiche	<i>Arapaima gigas</i>	Paiche
Pimelodella	<i>Pimelodus sp., Pimelodella sp.</i>	Pimelodelas
<i>Piranha</i>	<i>Serrasalmus sp.</i>	Pirañas
Pirapitinga	<i>Piaractus brachypomus</i>	Paco
Pleco	<i>Peckoltia sp.</i>	Peckoltias
Pleco	<i>Pseudorinelepis</i>	Pleco
Porthole catfish	<i>Callichthys callichthys, Dianema longibarbis, Hoplosternum thoracatum</i>	Shirui
<i>Ractacara</i>	<i>Psectrogaster amazonica</i>	Ractacara
Redtail catfish	<i>Phractocephalus hemiliopterus</i>	Peje torre
Red-tailed Sabalo	<i>Brycon erythropterum</i>	Sábalo de cola roja
Sailfin Pimelodid	<i>Leiarius marmnonatus, Leiarius pictus</i>	Achara
Silver croaker	<i>Plagioscion Squamosissimus</i>	Corvina
Skinny Tiger Characin	<i>Rhapiodon vulpinus</i>	Chambira
Snail-eating Doradid	<i>Megalodoras irwini</i>	Churero
South American Leaf-fish	<i>Monocirrhus polyacantus</i>	Pez hoja
South American Lungfish	<i>Lepidosiren paradoxa</i>	Pez pulmonado
Spotted Headstander	<i>Chilodus punctatus</i>	Chilodus
Stingray	<i>Potamotrygon sp.</i>	Rayas
<i>Sturiosoma</i>	<i>Sturiosoma sp.</i>	Shitari
Suckermouth catfish	<i>Rineloricaria sp., Lamontichthys sp., Sp.atuloricaria sp.</i>	Loricarias
Tetra	<i>Hyphessobrycon sp.</i>	Mojara
Tucunare	<i>Cichla monoculus</i>	Tucunaré
Whiptail Catfish	<i>Farlowella acus</i>	Farlowella
Woodcat	<i>Tatia sp.</i>	Novias

**F) Reptiles**

<b>English common name</b>	<b>Scientific Name</b>	<b>Spanish common name</b>
Spectacled caiman	<i>Caiman crocodylus</i>	Caimán

**G) Flora**

<b>English common name</b>	<b>Scientific Name</b>	<b>Spanish common name</b>
Abilla	<i>Fevillea cordifolia</i>	Habilla
Alta palm	<i>Mauritia flexuosa</i>	Aguaje
Alternantera	<i>Alternanthera alinifolia</i>	Ojo de pollo
Amazon tree-grape	<i>Pouruma cecropiaefolia</i>	Uvilla
Annatto	<i>Bixa orellana</i>	Achiote
Anthurium fosteri	<i>Anthurium fosteri</i>	Jergónquiro
Araza	<i>Eugenia stipitata</i>	Arazá

**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑÓN  
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Arracacha	<i>Arracacia sp.</i>	Arracacha
Ayahuasca	<i>Banisteriopsis sp.</i>	Ayahuasca
Banana	<i>Musa spp.</i>	Plátano
Barbasco	<i>Lonchocarpus sp.</i>	Barbasco
Basil	<i>Ocinum basilicum,</i> <i>O. micrathum</i>	Albahaca
Beggar's Tick	<i>Bidens pilosa</i>	Pacunga
Bell apple	<i>Passiflora nitida</i>	Granadilla
Bonafousia undulata	<i>Bonafousia undulata</i>	Sanango
Brazilnut	<i>Bertholletia excelsa</i>	Castaña
Bromelia	<i>Pitcairnia sp.rucei, Aechmea</i> <i>spp.</i>	Bromelia
Camu-camu	<i>Myrciaria dubia</i>	Camu camu
Cape gooseberry	<i>Physalis sp.</i>	Mullaca
Cashew	<i>Anacardium occidentale</i>	Marañón
Cassava	<i>Manihot esculenta</i>	Yuca
Cat's claw	<i>Uncaria tomentosa,</i> <i>U. guianensis</i>	Uña de gato
Chambira palm	<i>Astrocaryum chambira</i>	Chambira
Cheeseweed	<i>Malva parviflora, Malachra</i> <i>ruderalis</i>	Malva
Cherimoya	<i>Annona cherimolia</i>	Chirimoya
Chili pepper	<i>Capsicum spp.</i>	Ají
Chuchuhuasi	<i>Maitenus sp.</i>	Chuchuhuasi
Cinnamon	<i>Ocotea aciphylla</i>	Canela moena
Clove vine	<i>Tynanthus sp.</i>	Clavohuasca
Cocoa	<i>Theobroma cacao</i>	Cacao
Cocona	<i>Solanum Sessiliflorum</i>	Cocona
Cocoyam	<i>Xanthosoma sp.</i>	Uncucha
Coffee	<i>Coffea arabica</i>	Café
Copaiba balsam	<i>Copaifera sp.</i>	Copaiba
Curare	<i>Chondodendron sp.</i>	Curare
Curcuma	<i>Curcuma sp.</i>	Palillo / guisador
Custard apple	<i>Annona spp., Rollinia sp.</i>	Anona
Dragon fruit	<i>Selemicereus grandiflorus</i>	Pitahaya
Dragon's blood	<i>Croton lechleri</i>	Sangre de grado
Egg fruit	<i>Pouteria caimito</i>	Caimito
Eleutherine bulbosa	<i>Eleutherine bulbosa</i>	Yahuar piri piri
Fig	<i>Ficus insipida</i>	Ojé
Garcinia macrophylla	<i>Garcinia macrophylla</i>	Charichuelo
Golden Lantern	<i>Cassia reticulata</i>	Retama
Grapefruit	<i>Citrus paradisi</i>	Toronja
Grias neuberthii	<i>Grias neuberthii</i>	Sacha mango
Guarea sp.	<i>Guarea sp.</i>	Requilla
Guava	<i>Psidium guajaba</i>	Guayaba
<i>Guayusa</i>	<i>Ilex guayusa</i>	Guayusa
Horsetail	<i>Equisetum sp.</i> <i>Andropogon bicornis</i>	Cola de caballo

**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑÓN  
RIVER CORRIDOR IN PERU**

Huayruro	<i>Ormosia spp.</i>	Huayruro
Humari	<i>Poraqueiba sericea</i>	Humarí
Ice cream bean	<i>Inga edulis</i>	Guaba
Ipururo	<i>Alchornea castaneifolia</i>	Ipururo
Ivory palm	<i>Phytelephas macrocarpa</i>	Yarina
Jamaica cherry	<i>Muntingia calabura</i>	Yumanasi
Jatropha	<i>Jatropha spp.</i>	Piñón
Juniper	<i>Genipa americana</i>	Huito
Jute	<i>Urena lobata</i>	Urena o Yute
Laetia	<i>Laetia sp.</i>	Timareo
Long coriander	<i>Eryngium foetidum</i>	Sacha culantro
Macoubea guianensis	<i>Macoubea guianensis</i>	Loro micuna
Maiden's blush	<i>Sloanea sp.</i>	Pusanga caspi
Malay apple	<i>Syzygium malaccense</i>	Pomarosa
Milpesos palm	<i>Oenocarpus bataua</i>	Ungurahui
Mocambo	<i>Theobroma bicolor</i>	Macambo
Mombin	<i>Spondias sp.</i>	Ushum
Monkey pot	<i>Lecythis pisonis</i>	Olla de mono
Mountain Cabbage Palm	<i>Euterpe precatoria</i>	Huasaí
Mucuna huberi	<i>Mucuna huberi</i>	Vaca ñahui
Naranjo podrido (fruit)	<i>Parahancornia peruviana</i>	Naranjo podrido
Neea sp.	<i>Neea spp.</i>	Tupamaqui
Ñejilla fruit	<i>Bactris sp.</i>	Ñejilla
Orchids	<i>Cattleya spp., Laelia spp.</i>	Orquídea
Panama hat plant	<i>Carludovica palmata</i>	Toquilla
Pariana sp	<i>Pariana sp.</i>	Shacapa
Peanut	<i>Arachis hypogaea</i>	Maní
Perfume guava	<i>Campomanesia lineatifolia</i>	Palillo
Peru balsam	<i>Myroxylon balsamun</i>	Bálsamo
Philodendron	<i>Philodendron sp.</i>	Huambé
Piassava	<i>Aphandra natalia</i>	Piasaba
Pijuayo fruit	<i>Bactris gasipaes</i>	Pijuayo
Pineapple	<i>Ananas comosus</i>	Piña
Purple mombin	<i>Spondias cyatherea</i>	Taperibá
Quinine	<i>Cinchona spp.</i>	Quina
Casha vara	<i>Desmoncus sp.</i>	Casha vara
Remo caspi	<i>Remigia peruviana</i>	Remo caspi
Rosewood	Aniba roseadora	Palo de rosa
Rubber tree	<i>Hevea brasiliensis</i>	Jebe
Seagrape	<i>Coccoloba sp.</i>	Vino huayo
Sedge	<i>Cyperus sp.</i>	Piri piri
Sesame seed	<i>Sesamum indicum</i>	Ajonjolí
Shatter stone	<i>Phyllanthus sp.</i>	Chanca piedra
Sorva Gum	<i>Couma macrocarpa</i>	Leche caspi
Sourpop	<i>Annona muricata</i>	Guanábana
South American Sapote	<i>Matisia cordata</i>	Sapote
Soy	<i>Glycine soja</i>	Soya
Starfruit	<i>Averrhoa carambola</i>	Carambola

**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑON  
RIVER CORRIDOR IN PERU**

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Sugarcane	<i>Saccharum sp.</i>	Caña negra
Supay fruit	<i>Couepia sp.</i>	Supay ocote
Tangerines	<i>Citrus sp.</i>	Tangerina
Thoracocarpus	<i>Thoracocarpus bissectus,</i> <i>Heteropsis sp.</i>	Tamshi
Totumo	<i>Crescentia amazónica</i>	Tutumo
Wormseed	<i>Chenopodium ambrosioides</i>	Paico
Yellow apple	<i>Spondias monbin</i>	Ubos
Yellow passion fruit	<i>Passiflora edulis</i>	Maracuyá
Yellow sapote	<i>Pouteria lucuma</i>	Lúcuma

**Annex 03:**

# Matrix of the Main Bioindustry Stakeholders

Group or Institution	Function or Activities	Interests	Shortcomings	Consequences For the project
<b>Ministry of Foreign Affairs</b>	<ul style="list-style-type: none"> <li>- Promotes the Peru-Ecuador Binational Border Development Plan.</li> </ul>	<ul style="list-style-type: none"> <li>- To promotes peace and development on the border.</li> <li>- To promotes sustainable development of resources on the common border.</li> </ul>	<ul style="list-style-type: none"> <li>- Not decentralized.</li> </ul>	<ul style="list-style-type: none"> <li>- Link to bilateral and multilateral entities.</li> </ul>
<b>Ministry of Economy and Finance</b>	<ul style="list-style-type: none"> <li>- Manages public economic and financial policy.</li> <li>- Economic tax policy.</li> </ul>	<ul style="list-style-type: none"> <li>- Balanced and effective budget allocation.</li> </ul>	<ul style="list-style-type: none"> <li>- Short-term vision.</li> <li>- Political priorities.</li> </ul>	<ul style="list-style-type: none"> <li>- Promotes or discourages investment (higher/lower taxes)</li> </ul>
<b>Ministry of Agriculture</b> - Loreto and Amazonas Regional Agricultural Directorate.	<ul style="list-style-type: none"> <li>- Formulates and proposes policies for the sector.</li> <li>- Promotes crops.</li> </ul>	<ul style="list-style-type: none"> <li>- To increase agricultural production.</li> </ul>	<ul style="list-style-type: none"> <li>- Insufficient resources.</li> <li>- Insufficient personnel.</li> </ul>	<ul style="list-style-type: none"> <li>- Budget as compensation for crops.</li> </ul>
<b>Ministry of Fishing</b>	<ul style="list-style-type: none"> <li>- Formulates and proposes policies for the sector.</li> <li>- Promotes fishing activities.</li> </ul>	<ul style="list-style-type: none"> <li>- To stimulate fishing production.</li> </ul>	<ul style="list-style-type: none"> <li>- Slow, overly bureaucratic.</li> <li>- Insufficient resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Matching funds (FONDEPES) for aquaculture</li> </ul>
<b>National Institute for the Defense of Competition and Protection of Intellectual Property (INDECOPI)</b>	<ul style="list-style-type: none"> <li>- Registers trademarks and patents.</li> <li>- Protection of Intellectual Property.</li> </ul>	<ul style="list-style-type: none"> <li>- To support positioning of products in the market.</li> </ul>	<ul style="list-style-type: none"> <li>- Slow overly bureaucratic.</li> <li>- Inefficient at regional level.</li> </ul>	<ul style="list-style-type: none"> <li>- Facilitates certification and protects intellectual property rights on products.</li> </ul>
<b>National Institute for Agriculture and Agro Industrial Research (INIAA)</b>	<ul style="list-style-type: none"> <li>- Conducts researches at the primary stage.</li> <li>- Transfers technology.</li> </ul>	<ul style="list-style-type: none"> <li>- To raise productivity.</li> <li>- Genetic improvement.</li> </ul>	<ul style="list-style-type: none"> <li>- Insufficient budget and personnel.</li> </ul>	<ul style="list-style-type: none"> <li>- Technical and scientific support.</li> </ul>
<b>National Institute of Natural Resources (INRENA)</b>	<ul style="list-style-type: none"> <li>- Promotes and supports sustainable use of resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Conservation of natural resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Centralized</li> <li>- Little interest in issuing rules to facilitate concessions.</li> </ul>	<ul style="list-style-type: none"> <li>- Facilitates access to land and concessions.</li> </ul>



**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑÓN  
RIVER CORRIDOR IN PERU**

<b>Group or Institution</b>	<b>Function or Activities</b>	<b>Interests</b>	<b>Shortcomings</b>	<b>Consequences For the project</b>
<b>National Health Service (SENASA)</b> <b>National Council on the Environment (CONAM)</b>	<ul style="list-style-type: none"> <li>- Pest and animal health control.</li> <li>- Coordinates public policy on environmental issues.</li> </ul>	<ul style="list-style-type: none"> <li>- Training in agricultural health.</li> <li>- To organize the national strategy on biological diversity.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of budget.</li> <li>- Lack of personnel</li> <li>- Weak presence in the region.</li> </ul>	<ul style="list-style-type: none"> <li>- Strategic partner to combat pests and disease.</li> <li>- Coordinate with other sectors on environmental conservation.</li> </ul>
<b>Export Promotion Commission (PROMPEX)</b>	<ul style="list-style-type: none"> <li>- Promotes exports, including bioindustry.</li> </ul>	<ul style="list-style-type: none"> <li>- To make bio industry export more dynamic.</li> </ul>	<ul style="list-style-type: none"> <li>- Insufficient budget</li> </ul>	<ul style="list-style-type: none"> <li>- Coordinates with public and private sector.</li> <li>- Partnership for breaking into new markets.</li> </ul>
<b>CTAR - Loreto and CTAR - Amazonas</b>	<ul style="list-style-type: none"> <li>- Promote investment in the region.</li> <li>- Release funding for projects</li> </ul>	<ul style="list-style-type: none"> <li>- Promote rational use of resources.</li> <li>- Contribute to regional development.</li> </ul>	<ul style="list-style-type: none"> <li>- Little technical, financial and management capacity.</li> <li>- Short turnover period for officials.</li> </ul>	<ul style="list-style-type: none"> <li>- Investment with positive synergy.</li> </ul>
<b>National Commission on Corporations and Securities (CONASEV)</b>	<ul style="list-style-type: none"> <li>- Supervise placement of securities</li> </ul>	<ul style="list-style-type: none"> <li>- To expand the Peruvian capital market.</li> </ul>	<ul style="list-style-type: none"> <li>- Little development of the capital market in the region.</li> </ul>	<ul style="list-style-type: none"> <li>- Tax benefits for ecofund investors.</li> </ul>
<b>International Technical Cooperation Agencies</b>	<ul style="list-style-type: none"> <li>- Promote bioconservation and sustainable development</li> </ul>	<ul style="list-style-type: none"> <li>- To improve quality of life for target groups.</li> </ul>	<ul style="list-style-type: none"> <li>- Difficulty in accessing assistance</li> </ul>	<ul style="list-style-type: none"> <li>- Additional funds for biobusiness.</li> </ul>
<b>Peruvian Amazon Research Institute - IIAP</b>	<ul style="list-style-type: none"> <li>- Generates cultivation technologies.</li> <li>- Conservation of biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>- To transfer technology.</li> <li>- To contribute to regional development.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of focus or results.</li> <li>- Needs to integrate with the business sector.</li> </ul>	<ul style="list-style-type: none"> <li>- Supplies basic technology</li> <li>- Information source</li> </ul>
<b>Peruvian Amazon National University - UNAP</b>	<ul style="list-style-type: none"> <li>- Training of professionals.</li> <li>- Genetic research and transfer</li> </ul>	<ul style="list-style-type: none"> <li>- To give production added value.</li> <li>- To supply professionals in different specialities.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of modern vision</li> <li>- Structure and awkward mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>- Makes available processing technology and infrastructure.</li> <li>- Trains professionals.</li> </ul>

**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIODIVERSITY IN THE AMAZON - MARAÑON  
RIVER CORRIDOR IN PERU**

<b>Group or Institution</b>	<b>Function or Activities</b>	<b>Interests</b>	<b>Shortcomings</b>	<b>Consequences For the project</b>
<b>Farmers, fish breeders and other producers.</b>	<ul style="list-style-type: none"> <li>- Produce raw material in the quantity and quality required.</li> <li>- Efficient crop and wild area management.</li> </ul>	<ul style="list-style-type: none"> <li>- To increase their income.</li> <li>- To improve their quality of life.</li> <li>- To preserve the biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of resources.</li> <li>- Little training.</li> <li>- Resistance to change.</li> <li>- Short-term vision.</li> </ul>	<ul style="list-style-type: none"> <li>- Base for creation supply of product for export.</li> <li>- Receive training and technical assistance</li> </ul>
<b>Entrepreneurs</b>	<ul style="list-style-type: none"> <li>- Give resources added value.</li> <li>- Manufacture competitive products.</li> </ul>	<ul style="list-style-type: none"> <li>- To maximize economic profits.</li> <li>- To reduce risks.</li> <li>- To preserve biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>- Limited supply</li> <li>- Domestic vision of the market.</li> <li>- Little social awareness.</li> <li>- Limited capital.</li> </ul>	<ul style="list-style-type: none"> <li>- Broaden supply.</li> <li>- Participation in the productive chain.</li> </ul>
<b>NGOs</b>	<ul style="list-style-type: none"> <li>- Support target groups.</li> <li>- Integrate target groups with the market.</li> </ul>	<ul style="list-style-type: none"> <li>- To pave the way for sustainability.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of experience in biodiversity projects.</li> </ul>	<ul style="list-style-type: none"> <li>- Strategic partner with entrepreneurs and producers.</li> </ul>

Note: There are also other institutions that are indirectly linked to bioindustry, including CONCYTEC and business associations (ADEX, COMEX, SIN, CCL).

Annex 04:

## Population of the Amazon – Marañón Corridor

DEPARTMENT/ PROVINCE	DISTRICT	TOTAL POP. 1981 (1)	TOTAL POP. 1993 (2)	TOTAL POP. 2000 (3)	POP DENS. Km <sup>2</sup> (2000)	GROWTH (3-2)/(2)
Amazonas						
Condorcanqui	Nieva	8697	17104	8363	1.86	-51.11%
	El Cenepa	10422	9568	22666	4.24	136.89%
	Río Santiago	10413	9365	8206	1.02	-12.38%
		<b>29532</b>	<b>36037</b>	<b>39235</b>	<b>2.20</b>	<b>8.87%</b>
Bagua	La Peca	21920	30868	36414	124.97	17.97%
	Aramango	8433	13869	17,596	21.59	26.87%
	Copallín	6072	6816	6975	77.34	2.33%
	El Paco	1135	1104	1054	73.35	-4.53%
	Imaza	10392	21911	31423	6.93	43.41%
	<b>47952</b>	<b>74568</b>	<b>93462</b>	<b>16.27</b>	<b>25.34%</b>	
<b>TOTAL AMAZONAS</b>		<b>77484</b>	<b>110605</b>	<b>132697</b>	<b>9.23</b>	<b>19.97%</b>
Loreto						
Alto Amazonas	Yurimaguas	38664	52831	59733	22.25	13.06%
	Balsa Puerto	7053	10934	13418	6.20	22.72%
	Barranca	4696	8558	11537	1.93	34.81%
	Cahuapanas	4288	7598	10077	7.57	32.63%
	Jeberos	3731	3375	3289	0.71	-2.55%
	Lagunas	9708	12164	13192	2.34	8.45%
	Manseriche	3873	7098	9600	2.75	35.25%
	Morona	3489	1331	1141	0.13	-14.27%
	Pastaza	8390	13671	17118	0.75	25.21%
	Santa Cruz	3304	4155	4515	2.60	8.66%
	Tnt. C. López	4079	5157	5622	3.40	9.02%
	<b>91275</b>	<b>126872</b>	<b>149242</b>	<b>2.44</b>	<b>17.63%</b>	
Nanay	Iquitos	183848	272466	331548	55.89	21.68%
	Alto Nanay	2097	2360	2459	0.18	4.19%
	Fern. Lores	14393	17357	18737	3.83	7.95%
	Indiana	10108	14280	16900	7.95	18.35%
	L. Amazonas	8850	12001	13869	2.08	15.57%
	Mazán	7696	12106	15250	1.79	25.97%
	Napo	9361	12829	14917	0.50	16.28%
	Punchana	31700	54857	73043	102.70	33.15%
	Putumayo	4230	7340	9788	s/d	33.35%
	T. Causana	3377	5258	6584	0.79	25.22%
	Yaquerana	802	1866	2950	s/d	58.09%
	<b>276462.00</b>	<b>412720</b>	<b>506045</b>	<b>6.14</b>	<b>22.61%</b>	
Loreto	Nauta	15881	26703	33918	5.36	27.02%
	Parinari	7065	7918	8118	0.69	2.53%
	Tigre	6764	5858	5299	0.30	-9.54%
	Trompeteros	1981	4303	6157	0.46	43.09%
	Urarinas	6969	9548	1018	0.06	-89.34%
	<b>38660</b>	<b>54330</b>	<b>54520</b>	<b>1.37</b>	<b>0.34%</b>	
<b>TOTAL LORETO</b>		<b>406397</b>	<b>593922</b>	<b>709807</b>	<b>3.32</b>	<b>19.51%</b>
<b>TOTAL AMAZONAS AND LORETO</b>		<b>483881</b>	<b>704527</b>	<b>842504</b>	<b>6.28</b>	<b>19.58%</b>

Source: INEI (1993). 1993 National Population and Housing Census.

**Annex 05:**

**List of species in the biological diversity of  
the Amazon – Marañón corridor according to  
market potential**

Resource	External Market	Domestic Market	Regional Market	Subsistence
<b>Fruits / Food</b>				
Aguaje				
Uvilla				
Araza				
Bell apple				
Camu-camu				
Mullaca				
Cashew				
Cassava				
Cocona				
Caimito				
Charichuelo				
Sacha mango				
Guayaba				
Humari				
Guaba				
Ivory palm				
Yumanasi				
Loro micuna				
Ungurahui				
Mocambo				
Ushum				
Huasai				
Naranjo podrido (fruit)				
Ñejilla fruit				
Palillo				
Pijuayo fruit				
Pineapple				
Sapote				
Vino Huayo				
Supay fruit				
Ubos				
Yellow passion fruit				
Yellow sapote				
<b>Medicinal</b>				
Cat's claw				
Copaiba balsam				
Dragon's blood				
Quinine				
Chanca piedra				

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RIVER CORRIDOR IN PERU**

<b>Resource</b>	<b>External Market</b>	<b>Domestic Market</b>	<b>Regional Market</b>	<b>Subsistence</b>
<b>Ornamental</b>				
Bromelia				
Ferns				
Gingers				
Heliconias				
Orchids				
Palms				
<b>Oleaginous</b>				
Aguaje				
Ungurahui				
Peanut				
Pijuayo fruit				
<b>Biocides</b>				
Barbasco				
Curare				
<i>Requilla</i> (Guarea Sp.)				
<b>Fish</b>				
Boquichico				
Gamitana				
Dorado				
Paiche				
Pirapitinga				
Zungaro				
<b>Plant fibers</b>				
Panama hat plant				
Chambira palm				
Casha vara				
Piassava				
Tamshi				
Huambe				
<b>Colorants / Spices</b>				
Achiote				
Huito				
Chile pepper				
Palillo				
<b>Animal breeding</b>				
Caimans				
Ronsoco				
Sajino				
Frogs				
Insects				
Macaws				
Monkeys				

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<b>Resource</b>	<b>External Market</b>	<b>Domestic Market</b>	<b>Regional Market</b>	<b>Subsistence</b>
Majaz				
Parrots				
Snails				
Snakes				
Turtles				
Huangana				
<b>Industrial</b>				
Fig				
Ivory palm				
LATEX RESINS				
Rosewood				
Rubber tree				
Leche caspi				

## Annex 06:

# List of Participants in the Preparation of the Strategic Plan

### Supervision

Dennis del Castillo Torres	IIAP President
Roger Beuzeville Zumaeta	IIAP General Manager
Luis Campos Baca	Biodiversity Program Director
Carlos Linares Bensimón	Land Ecosystems Program Director
Fernando Rodríguez Achung	Environmental Planning Program Director
Salvador Tello Martín	Aquatic Ecosystems Program Director
Yolanda Guzmán Guzmán	Scientific and Technological Cooperation Office Director
Hernán Tello Fernández	BIODAMAZ National Director

### Editing and Writing

Alberto García Mauricio	Coordination
Jürg Gasché Suess	Cultural Diversity
Yolanda Guzmán Guzmán	Strategic Planning
Carlos Linares Bensimón	Biodiversity Management
Hernán Tello Fernández	Strategic Planning

### Revision

Carlos Lescano Anadón	Food Industries
Sonia Salas Dominguez	Food Industries
José Luis Silva Martinot	Entrepreneur
Alejandra Velazco Muñoz	Entrepreneur

### Text correction

José Álvarez Alonso	Biology
Walter Herz Saenz	Social Communicator



**Consultants**

Jorge Arce Mesía	Regional Planning and Economy
Jorge López de Castilla	Biodiversity Market
Augusto Montes Gutiérrez	Value-adding technologies, tropical fruits

**Consultancy coordinator**

Javier García Saavedra	Economist
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**Annex 07:**

## **Support Consultancies for the Strategic Plan on Bioindustry**

<b>Code</b>	<b>Title of the consultancy</b>	<b>Consultant</b>
BIO1.1-A	Incentivos para el desarrollo de la Bioindustria en la Amazonía Peruana.	Vera La Torre, José Carlos
BIO1.1-B	Las herramientas de propiedad industrial como elementos de desarrollo regional.	Mera Gómez, Teresa
BIO1.1-C	Financiamiento de bio-negocios amazónicos.	Salazar Barrantes, José
BIO1.1-D	Aspectos normativos relacionados con la acuicultura y aplicabilidad en la Amazonía Peruana	Alcántara Bocanegra, Fernando
BIO1.2-A	Bioseguridad en el Perú.	Campos Baca, Luis
BIO1.2-B	Acceso a los recursos genéticos.	Campos Baca, Luis
BIO1.2-C	Propiedad intelectual, certificación y acreditación de la calidad ambiental.	Campos Baca, Luis
BIO2.1-A	Cadena de valor de frutos del aguaje en Iquitos, Perú.	Rojas Ruiz, Roberto
BIO2.1-B	Cadena de valor: el caso del pijuayo para palmito.	Acosta Vega, Aldo
BIO2.1-C	Cadena de valor de una de gato y barbasco.	Caritas Chachapoyas
BIO2.1-D	Producción de veneno cristalizado de serpiente en Condorcanqui, Amazonas.	CTAR-Amazonas
BIO2.1-E	Cadena de valor del camu camu.	Cornejo Arana, Carlos
BIO2.1-F	Cadena de valor de la Chirimoya	Gómez, Juan José
BIO2.1-G	Importancia, cualidades y potencial comercial que tiene la pitahaya.	Gómez, Juan José
BIO2.1-H	Cadena de valor de sangre de grado.	Rengifo Salgado, Elsa
BIO2.1-I	Cadena de valor de los recursos priorizados en una perspectiva de competitividad: paiche, churo, gamitana y doncella.	Alcántara Bocanegra, Fernando
BIO2.1-J	Peces ornamentales amazónicos.	Panduro Norohna, Edgard
BIO2.1-K	Cadena de valor del barbasco.	García Mere, Carlos

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<b>Code</b>	<b>Title of the consultancy</b>	<b>Consultant</b>
BIO2.1-L	Cadena de flores y follaje tropical.	Meza Aguilar, Wilfredo
BIO2.1-M	Cadena de valor del caso camu camu.	Pinedo Panduro, Mario
BIO2.2-A	Desarrollo de capacidades humanas.	Pasquel Quevedo, Antonio
BIO2.3-A	Propuesta para mejorar la infraestructura de apoyo a la bioindustria.	Acosta Vega, Aldo CTAR Amazonas
BIO3-A	El veneno de serpiente en la industria e investigación farmacológica. (Parte I y Parte II)	Poggi Estremadoyro, Dante
BIO3-B	Diagnostico de mercado de sangre de grado.	Lazarte Farfán, José
BIO3-C	Estrategias para el desarrollo de mercados de productos procesados a partir del paiche.	Instituto Tecnológico Pesquero
BIO3-D	Estrategias de mercado para el paiche.	Mandriotti Castro, Miguel
BIO3-E	Tecnologías de valor agregado, marketing y comercialización de flores ornamentales y follaje tropicales.	Giraldo Aristizabal, César
BIO3-F	Diagnóstico de mercado del camu camu.	Cornejo Arana, Carlos
BIO4.1-A	Selección y priorización de recursos en el departamento de Amazonas.	CTAR Amazonas
BIO4.1-B	Prorización de recursos en la parte norte del departamento de Amazonas.	Gómez, Juan José
BIO4.1-C	Principales recursos de la diversidad biológica de la cuenca del marañón.	Cáritas Chachapoyas
BIO4.1-D	Selección y priorización de plantas medicinales de la Amazonía Peruana.	Rengifo Salgado, Elsa
BIO4.1-E	Selección y priorización de recursos ornamentales.	Meza Aguilar, Wilfredo
BIO4.1-F	Priorización de recursos de acuicultura.	Alcántara Bocanegra, Fernando Tello Martín, Salvador
BIO4.1-G	Inventario y priorización de recursos forestales no maderables más relevantes para el desarrollo de la bioindustria en el eje Marañón – Amazonas.	Otárola Acevedo, Erasmo Baluarte Vásquez, Juan
BIO4.2-A	Tecnología para generar valor agregado de plantas medicinales de la Amazonía Peruana, camu camu, sangre de grado y uña de gato.	Sandoval Chacón, Manuel
BIO4.2-B	Ingeniería del proyecto camu camu.	Montes Gutiérrez, Augusto
BIO4.2-C	Aplicaciones tecnológicas para el procesamiento del paiche en la Amazonía Peruana.	Instituto Tecnológico Pesquero

**ANNEXES**

**STRATEGIC PLAN FOR THE DEVELOPMENT OF BIOINDUSTRY IN THE AMAZON - MARAÑÓN  
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<b>Code</b>	<b>Title of the consultancy</b>	<b>Consultant</b>
BIO4.2-D	Sistema de información de mercados, precios y tecnologías de productos y servicios de la diversidad biológica.	Miyakawa Solís, Víctor
BIO5.1-A	Caracterización de los recursos naturales y condicionantes socioeconómicos del corredor de desarrollo económico Amazonas – Marañón.	Maco García, José
BIO5.1-B	Zonificación de cinco productos con potencial de desarrollo para la bioindustria en el eje Amazonas – Marañón.	Chumbimune Zanabria, Rafael
BIO5.3-A	Sostenibilidad, oferta y agenda de investigación, caso camu camu.	Pinedo Panduro, Mario
BIO5.3-B	Plan de manejo sostenible del cultivo de heliconias.	Meza Aguilar, Wilfredo
BIO5.3-C	Acceso y conservación del recurso paiche.	Alcántara Bocanegra, Fernando
BIO5.3-D	Investigación bioalimentaria del camu camu y del aguaje	Pasquel Quevedo, Antonio

**Annex 08:**

**Map of the area of influence**